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Staff Report

AIR FORCE



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USAF OFFICER EVALUATION SYSTEMS

Review & Research Recommendations

PERSONNEL DIVISION

23 February 1971

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## USAF OFFICER EVALUATION SYSTEMS

### STAFF REPORT

Memorandum for OER Workshop Participants/Attendees

Appendices number 2 through 7 are not attached to Staff Report, since attendees were present for briefings (Appendix 2), and Interim Report of Panel Proposals (Appendices 3-7) have been distributed previously.

The preceding Appendices are included in Staff Report being forwarded to HQ USAF.

USAF OFFICER EVALUATION SYSTEM:  
REVIEW AND RESEARCH RECOMMENDATIONS

PURPOSE

The USAF Deputy Chief of Staff for Personnel has asked that a new Officer Evaluation System be developed. This report outlines alternatives and development approaches created by the Air Force Human Resources Laboratory.

BACKGROUND

There has been extensive operational experience with evaluation systems in all branches of the Armed Forces, other government agencies, and industry. Many approaches have been employed and in some cases a given organization has used more than one methodology. A modest - but continuing - analysis of data generated by the Air Force system has been under way for several years. Similar data have been accrued in other organizations and a reasonable body of expertise on evaluation methodologies has developed in several universities.

Evaluation systems may themselves range from very simple to quite complex. But within the Air Force, because of the many roles for which evaluations are used and the diverse circumstances under which ratings are rendered, impact of the system used is considerable - on the individual as well as on the Air Force and the country.

Today's Officer Effectiveness Reports (OER) influence promotions, assignments, career and performance counseling, and fill several supplemental functions. Adequateness of the existing system varies between the functions for which used, but the dominant visible defect is inflation -

a worsening tendency for raters to rate subordinates at the highest possible level. This makes discrimination between officers, especially for promotion, progressively more difficult.

There is considerable historical evidence to indicate that the risk of failure is very high for a new evaluation methodology. Systems tried within the Air Force in the past which forced discrimination, or mechanically precluded inflation, proved so unpopular that they were discontinued. Various efforts to avoid inflation in systems which do not mechanically prevent the problem have uniformly failed.

#### AFHRL APPROACH

To increase the odds of developing a discriminating system which could be accepted, AFHRL collected the best experience information now available, presented the data and the existing Air Force system to a Workshop composed of national experts drawn from industry, universities, government laboratories, and the Armed Forces; and had five panels composed of these experts provide recommendations for system changes in development approaches.<sup>1</sup> Participants are listed in Appendix 1.

Documentation on present Army, Navy, Marine Corps, Coast Guard, Air Force (Military and Civilian), General Motors, J.C. Penney Company, IBM, Royal Air Force, and Royal Australian Air Force Systems is given in Appendix 2.

Panel recommended systems are presented in Appendix 3 through 7. Appendix 8 is a sixth approach developed independently by Lt Colonel Robert A. Dineen of AFHRL.

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<sup>1</sup>Liberal support to this project was provided by the Office of Scientific Research which managed the contractual part, University of Maryland, Purdue University, Kent State University, Arizona State University, Medical College of Georgia, General Motors Corporation, International Business Machines, Inc., American Institute for Research, Personnel Decisions, Inc (University of Minnesota), Fieldcrest Mills, Inc., Royal Air Force, Royal Australian Air Force, Office of Naval Research, Coast Guard, Marine Corps, Army Staff, Navy Staff, and Air Staff.

## COMPARISON OF WORKSHOP PANEL PROPOSALS

The USAF Officer Evaluation System Workshop was comprised of five working Panels of personnel management specialists from industry, academic institutions, the military services and various government agencies. The Panels were known as the Crimson, Red, Orange, Maroon and Scarlet Panels - Appendices 3-7 lists the membership of each of the Panels. The Workshop Panels were assigned four major tasks, namely, (1) produce at least one evaluation system proposal with recommendations for follow-on research; (2) prepare presentations of proposals for review and critique by the Workshop; (3) prepare a report of proposals and recommendations; (4) academic/industrial consultants critique the Panel Reports subsequent to completion of the Workshop.

The five Workshop Panels deliberating independently, developed eight distinct recommendations which were called the Crimson A and Crimson B Proposal; the Red A, Red B and Red C Proposal; the Orange Proposal, the Maroon Proposal; and the Scarlet Proposal. The Panel Reports are presented in their entirety in Appendices 3-7. The present section summarizes areas of consensus in the Panel approaches and briefly considers a few of the distinctive and unique features of each of the proposals.

### Promotion Potential Evaluations and Feedback

The Red A and B, Scarlet, Orange, and Crimson A proposals all provide for a separate promotion potential evaluation document, which to varying degrees would be maintained as "confidential." The Red A proposal recommends that the evaluation document be reviewed by the indorsing official. The promotion potential document would then be directly forwarded to the Selection Secretariat's file. Rating distributions by grade and command would be provided to all raters and ratees. Ratee feedback would also include a comparison

of the individual's relative standing with his contemporaries and an estimate of promotion probability (in percentage terms) based on regression analysis. The Red B Proposal is similar to the Red A Proposal, except that it allows ratees to review appraisals after promotion action. The Scarlet Proposal suggests a separate, or detachable form (from the performance evaluation) that includes a promotion potential score which would be confidential. The Proposal of the Orange Panel includes a separate confidential promotion potential rating and provides for ratee feedback at critical stages. For career officers, critical stage reviews would be conducted upon entering the secondary and primary zones of eligibility for promotion to major, lieutenant colonel and colonel. A second independent promotion potential evaluation would also be accomplished by the second echelon supervisor. In addition, provision is made in the Orange Proposal for a base level review board for quality control purposes.

The Crimson A plan provides for a confidential promotion potential rating with a one-time feedback of rating distribution to raters and a "no disclosure policy" thereafter. The second and third echelon supervisors may also accomplish promotion potential evaluations on the ratee under the Crimson A system, but such ratings would be independent and there would be no indorsement or review procedure for any of the promotion potential ratings. Ratees would be assigned a 0 to 99 score in promotion potential with no rater being permitted to rate any two of his ratees with the same score (no ties).

The Red C, Maroon and Crimson B proffered evaluation systems are all



"open systems," i.e., ratees would have access to their promotion potential ratings. The Maroon and Crimson B Proposals advocate administrative control (of inflation) procedures. Under the Maroon system called PAT (Point Allocation Technique), a minimum of three officers would be evaluated simultaneously. If a particular supervisor does not have three ratees, he would pool his ratees with those of his supervisor, and so forth, until a minimum ratee group is established. If necessary, the two or more supervisors form an evaluation panel for the purpose of allocating points. Each rater has 100 points per ratee for each factor considered and these are distributed among the pool to establish an ordering of ratees. A standardization procedure is then used to evaluate the USAF-wide population for each grade. The Crimson B system advocates that the present OER system be retained, but that each MAJCOM would be given a mandatory quota for specific rating levels for distribution throughout the command.

#### Single Versus Multipurpose Forms

A number of proposals (Orange, Scarlet, Crimson A, Red A and Red B) recommended that different forms be used for different purposes rather than using a multipurpose form as is presently the case. In general, the recommendation would be to provide one form for job description, another form for job performance evaluation, another form for promotion potential and another form for job and/or career counselling. The Red C Proposal provides for separate self-appraisal and a rater history forms, but includes a multipurpose form for the functions of performance evaluation, promotion potential evaluation, and counselling. The Maroon, and Crimson B system proposals are based on multipurpose forms similar to the present AF Forms 77 and 707.

### Simultaneous Submission of Ratings

With regard to the timing of submittal of promotion potential ratings for career officers, all Panel Proposals, with the exception of the Red and Crimson B, were in agreement that ratings should normally be submitted annually and simultaneously by grade. For example, all annual promotion potential evaluations would be due March 1 for captains, July 1 for majors, etc. This change would provide raters and all levels of review a means for simultaneously and directly comparing the promotion potential reports of all officers of the same grade.

### Job Description

Three of the Panels (Crimson, Orange and Red) addressed the job description aspect of the evaluation system. All were in agreement that the ratee should provide an input into preparation of the job description. The Crimson A Proposal provides for preparation and updating of the job description by the supervisor through discussion with the ratee. Under this system, the supervisor is to assign quantitative scores using benchmark scales for each position. The Orange Panel Proposal provides for all ratees to prepare the job description and quantitatively evaluate the position as to difficulty. The job description would then be reviewed and approved or adjusted, if necessary, by the rater. The Red A Proposal recommends joint preparation and agreement upon specific duty description at the start of the rating period. The indorser would review the duty description and it would then become available to Military Personnel Center Assignments. In addition to the Red A requirements for a jointly prepared duty description, the Red B Proposal provides that a formal

job-oriented appraisal be included. The Scarlet and Maroon panels did not consider this aspect of the officer evaluation system.

#### First-Tour Officers

The Orange, Maroon, and Red Panels consider the problem of an appraisal system for first-tour officers as distinct from that of career officers. First-tour officers were viewed as requiring a separate appraisal system which provides for career counseling, guidance and development, job performance and augmentation evaluation and assignments evaluation. It was generally recommended that the first-tour officer evaluation system be an open system.

#### Education and Training Program

The need for a continuing education and training program directed at educating raters and ratees on the evaluation system requirements of the Air Force was considered by all Panels. All Panels agreed that an education and training program was necessary for the implementation and continued proper operation of any new system. Various methods of instruction including Air Force-wide classroom and home study courses, training films, programmed instruction booklets, and the use of travelling teams of instructors were recommended. Inclusion of a block of instruction in the PME, AFROTC, OTS, AFA programs was also suggested.

#### Data Automation

All Panels which considered the topic of data automation of the evaluation system recommended provision for optical scanning of the reports and the establishment of a data bank as a basis for continuing analysis and long-term research.

## SOLUTION ALTERNATIVES

### General

There is a general consensus among our experts that multiple purposes for which the present OER is used cannot best be satisfied by a single document. Separate job description, job performance, and promotion potential evaluation systems are recommended. Further, instruments required for grades 2d Lieutenant through First-Tour Captain should differ from those used for senior Captain through Lt Colonel. Our focus is on the latter group.

### Job Description

The job description is a basic building block for an overall evaluation system. It should be carefully developed and adequately used. Production of this instrument is a rater responsibility in interaction with the ratee. Unfortunately, the relationship between the job description and performance evaluation has not been satisfactorily emphasized in the operating system. Guidance and standardization of how this tool will be developed has not been provided. We recommend that standardized guidance be published by Hq USAF at an early date. No research and development is needed to facilitate such instructions.

Job responsibility and job requirement considerations are implicit to the assignment and promotion activities. A methodology for defining and rating job requirement factors was developed by the Personnel Division in 1964. M/General Harry J. Sands and his USAF Study Group on Specialized Officer Career Development recommended in 1968 that this methodology be applied USAF-wide. It would give additional relevant discrimination. We recommend that application of the methodology by supervisors to job descriptions and routine reporting of results to indorsers, promotion and assignment activities be required. (Appendix 9 contains the methodology, but updating is needed.)

### Performance Evaluation

Job performance is highly relevant to assignment, but not completely correlated with promotion potential. An officer may deserve high performance marks, yet lack promotion potential. Another officer may be working in a new area intentionally given for career broadening. Short range performance can be expected to drop; but promotion potential may be enhanced.

The Workshop concluded that separation of performance and promotion potential ratings is not only needed, but that performance evaluation should be made more specific to the job and individual. The rating instrument should be composed of multiple factors tailored to the occupational area. Raters should be asked to mark only the factors relevant to the specific job.<sup>2</sup> The performance evaluation would be openly discussed with the subordinate, then forwarded to the assignment activity and to the indorser.

To initiate this performance evaluation system, it is recommended that career field forms initially be created for the ten major officer career areas. Let raters add relevant factors as the system operates and further break-out and augment the forms from these field generated data.

### Promotion Potential

Needs of the service, equity for officers, and uncertainty are key components of promotion potential ratings. USAF interests require that the

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<sup>2</sup>This is modeled after best features of the USAF Civilian Evaluation System.

evaluation system give sufficient discrimination to permit selection of the officer whose future performance will best meet service needs....But promotion is the dominant tangible reward - and a key motivator - for current performance. This creates pressures for inflation.

Two approaches can be used to attack inflation in today's system, assuming no fundamental changes. One approach involves making ratings confidential. This removes the pressure on the rater to inflate in order to motivate - or to avoid telling the ratee where he stands. The second approach involves imposing controls to force discrimination in ratings.

Since basic changes which remove the fundamental assumptions of today's system can be recommended only after realistic field testing - and since such field testing will take several months - the policy maker is limited in the short-range actions that he can take.

Some specific suggestions developed by the Workshop, which may give short-run relief include, (1) Quotas (of 9s, 8s, etc.) for major commands; (2) Base level committee review of ratings; (3) Indorser's quotas; (4) Confidential ratings; (5) Rater feedback on distribution of actual rating; (6) Training and education of raters; (7) Recorded and visible rater histories.

Recommendations on each of these alternatives are provided in the individual Panel Reports. Further, in addition to recommending two systems for field test (to be described later), we offer the following system for possible early implementation without necessity for field test. The system does not mechanically insure discrimination, but is clear and uncomplicated.

#### Early Implementation System

The underlying theme is that all echelons of command must recognize the

problem of people, yet at the same time accept the dictum that loyalty is to the Air Force first, people second. The indorser plays a critical role insuring loyalty goes "up" to the Air Force, not "down" to the individual officer. He controls personnel appraisals, inhibiting rater tendencies to inflate ratings. Most important is control over promotion potential appraisals. If an indorser feels a certain rating is unjustified, he must gain satisfaction from the rater, i.e., the rater is held responsible for each appraisal. Indorsers either concur in the appraisal, or execute a separate, independently prepared promotion potential appraisal.

Two other appraisals prepared for each ratee and forwarded to the indorser are on job description and job performance. A fourth document, rater history, indicates rank, job title, and promotion potential evaluations of past subordinates. It too is forwarded to indorsers. All four documents are weighted relative to consistency (or inconsistency) of rater appraisals, all familiar officers of same rank, requirements of the Air Force, and environment in which the ratee was working. Promotion potential, job descriptions, and job performance appraisals are forwarded to the Assignment Branch of MPC. The Selection Branch does not receive job performance appraisals. Appraisals schedules are in accordance with current regulations.

The promotion potential appraisal is confidentially prepared on a form similar to AF Form 77 and 707 less, specifically, overall evaluation, job duties, word picture and promotion potential as presently scaled. Promotion potential should be scaled in the following manner: Three years ahead of contemporaries; Two years ahead of contemporaries; Top 50% of those one year ahead of contemporaries; Lower 50% of those one year ahead of contemporaries;

Top third of those with contemporaries; Middle third of those with contemporaries; Lower third of those with contemporaries; One year behind contemporaries; Do not promote.

The confidential appraisal is forwarded by the indorser to both selection and assignment offices. The ratee has the option of including in his selection folder relevant information pertaining to any of his appraisals. Such information goes directly to the selection office, by-passing raters and indorsers.

The ratee's "open communication" is common with the two methods recommended for testing in the field. Two other common features, ratee and rater feedback procedures, are discussed in the context of these two methods.

#### ALTERNATIVES FOR FIELD TEST

The Air Force Human Resources Laboratory is recommending that two methods for insuring discrimination be field tested. Each approach has certain key common features.

Rater Feedback - both approaches give the rater annual feedback on mean and distribution of recent ratings. They provide a visible standard for the rater to use in assessing the ratee.

Ratee Feedback - one recommended system is completely open with instant ratee feedback; the other is confidential on specific ratings, but gives ratee feedback at key career decision points on how the individual compares with his contemporaries in terms of promotion probabilities.

Annual Calendar Ratings - both approaches require that ratings for a given grade be as of a given date. This is necessary to facilitate comparisons.



Open Communication - both approaches should be complemented by a USAF policy of open communication with promotion activities. Present policy on communicating with permanent boards needs be extended to temporary boards.

The systems being recommended for test involve variations of rank ordering within a ratee group. This methodology forces discrimination, provided ties are not permitted. While such a system insures that inflation is eliminated, it has off-setting undesirable features which require study and field-testing with respect to size of ratee group. Available data indicate that the number of officers rated by most first level supervisors is very small. A pool of at least three appears to be necessary for either system to work well. Four primary means have been identified for expanding pool size when required:

- . Have supervisor rank order - rate not only his subordinates, but also others whom he knows and feels competent to rate. This has the advantage of expanding the ratee pool, but it carries both practical and philosophical weaknesses. Adequate identification of non-subordinates would be difficult. Exposing the junior officer to evaluation by a senior who might be on the opposite side in critical decision issues might dampen the vigor with which alternatives are presented.....Standards for rating non-subordinates would probably differ among raters. Safeguards would probably be necessary to prevent use of non-subordinates as leverage to inflate rating of subordinates, etc.

- . Have rater rank order all his subordinates without regard to grade. This alternative also increases rating pool size, but implicitly assumes that all grades compete for the same higher grade level. It eliminates

the sequential ordering by grade that has been traditional.

. Have rater rank order ratee in population of people whom he has rated in the past. This alternative probably requires that ratee population include more than one grade. It would require assumption of incremental administrative duties by a central activity. A definitive approach for this alternative has been developed by Lt Colonel Dineen of the Personnel Division. We are abstaining from recommending a field test at this time because complexity of the system is such that user communication would be possible only with an extensive educational program. That need, plus the requirement of a limited field test to identify and correct administrative and other problems, make us categorize the approach as having merit, but requiring longer developmental time than other identified alternatives.

. Merge small rater pools, with second level supervisor making rank ordering after hearing advice by first level supervisors. While this approach lacks optimum rater exposure to ratee, it appears to be the least undesirable of feasible ways identified to insure that each ratee is compared to a reasonable number of his peers by a line supervisor. AFHRL recommends that that two variations of this method of getting a satisfactory ratee pool be field-tested.

#### Promotion Potential Ratings (Fresca Proposal, Free Scale - No Ties)

General - System applies to senior Captains, Majors, and Lt Colonels. All officers of a given grade are rated simultaneously, with exceptions as specified in rationale paragraph below. The system is to be completely automated, with ratings collected on forms designed for optical scanning.

Specific - Definition of Raters and Ratee Groups: Ratings are to be executed by all officers and civilians who are the first or second echelon supervisors (current rating and indorsing officials) of one or more individuals

in the grade under consideration. The ratee group for a particular rater consists of all officers within the grade under consideration for whom he is the first or second echelon supervisor. If a ratee group consists of more than ten, but fewer than twenty members, it shall be sub-divided into two ratee groups of approximate equal size. If it contains more than 20 but fewer than 30 members, it shall be divided into three groups of approximate equal size, and so on.

**Rating Procedure:** Members of each ratee group shall be rated on an overall promotion potential factor, as well as on a limited number of general subfactors related to potential. Ratings are to be assigned using a centile scale running from 00 to 99, with the restriction that no two members of a ratee group can be assigned exactly the same score value on a given factor. The frame of reference is "all officers of like grade." Second echelon supervisors are encouraged to gather information from immediate supervisors before executing their ratings.

**Disposition of Ratings:** Ratings are to be sent to a central agency, directly by the rating official. They are to remain forever confidential, except for use by assignment officers, promotion boards, and research personnel.

**Rater Feedback:** Raters are provided feedback concerning the overall distribution of ratings collected during the first rating cycle. No information about commands or occupational categories shall be published. Feedback after the first cycle may or may not be provided, depending upon data trends.

**Ratee Feedback:** At specified career points, every officer is provided information reflecting his promotion probabilities as compared with his contemporaries. These probabilities are computed using all available information, including previous promotion potential ratings; however, this information

shall be presented in a form which makes it impossible for him to infer the promotion potential ratings were given to him by a particular rating official.

Rationale and Supplementary Information - Simultaneous Annual Ratings of all Officers in Grade: This makes possible the formation of ratee groups which, in combination with the restriction of no-ties in assigned ratings, yields data from which man-to-man rankings can be derived. It also makes officer evaluation a scheduled annual event, rather than a chore which must be performed on an unscheduled basis.

Use of Centile Scores: Defines an initial frame of reference and gives freedom to rater for expressing his convictions concerning the potential of his subordinates. Any part or all of the scale may be used, and the perceived distances between ratees can be indicated. This freedom will contribute to user acceptability.

No-Ties Feature: Makes possible the derivation of ranking data. Forces some discrimination to be made at the local level by those individuals who are in the best position to make discriminations.

Sub-Division of Large Ratee Groups: It is recognized that the no-tie feature takes some freedom away from the rater. For example, only ten individuals in an undivided group of 25 could be rated above the 90th centile, even in an "elite" group on special assignment. It is evident that the larger the rating group, the less freedom the rater has to identify ratees in a limited range of the scale. Keeping ratee groups at size ten or below is a compromise between giving a rater complete freedom, and forcing him to make discriminations.

Subfactors on Promotion Potential. Provides useful information to assignment officers. Makes possible the derivation of differential promotion potential composites for various occupational areas, in case the Air Force should ever elect to move away from the concept of complete fungibility. Permits research on meaning of "overall promotional potential," as presently viewed by subclasses of rating officers.

Confidential Ratings: Takes pressure off of rater to inflate evaluations in order to maximize productivity of subordinates having "average" or "below average" potential. Potential ratings are matters of judgment which are partially based upon observation of characteristics which are not modifiable by the ratee. Ratees are periodically informed concerning their performance level, which enters into decisions about promotion potential.

Rater Feedback: It is hypothesized that, on the first cycle, some raters will follow the rules and assign a value of "50" to ratees they perceive as being average. Other raters will fear that inflation will continue, and will assign a value higher than "50" to subordinates they perceive as being average -- not because they wish to be dishonest with the system, but because they are not sure what the system is going to be. The feedback of the overall score distribution would permit everyone to play in the same "ball game." Command and occupational subgroup means should not be provided. If on one cycle the mean ratings for a particular subgroup is at the bottom of the distribution of all subgroup means, there is a natural tendency for members of that subgroup to inflate their ratings. This creates a "leap frog" effect, since some group mean always has to be on bottom.

Ratee Feedback: Every officer deserves to know how he stands with respect to his contemporaries in terms of promotion probabilities. Life decisions are based upon such information. The most useful feedback would be an accurate probability statement, which should weigh together all relevant information.

Out of Cycle Ratings: Since the system permits promotion potential ratings to be executed on a single individual, such ratings could be required under any set of conditions in which current OERs must be executed. Alternatives are possible, such as requiring an officer to be included in ratee groups formed at the annual report time, even though the officer has been reassigned to another organization during the report period.

First and Second Echelon Ratings: During data reduction, first and second echelon supervisory ratings would be separated. Raw data and composite scores derived from information from these two sources would each be made available to promotion boards. They could be combined if management so desires.

Derivation and Applications of Rank Information: Since no ties are permitted, individuals within rating groups could be ranked according to score level. After the first rating cycle, promotion boards could be provided with raw rank data, e.g., "Ranked second in a group of six." This information could be used in conjunction with other data relating to job content and assignment location to infer quality. After several rating cycles, rank data could be merged to produce a partial ordering of all officers being considered in a promotion cycle. Note that this ordering would not only

consider direct comparisons, but inferred transitive relationships. For example, if A were ranked above B at one time period, and B were ranked above C at a different location and time period, it can be inferred that A is higher than C, although these two individuals were never directly compared. One advantage of the proposed system is that the "no-ties" feature will produce meaningful information, even if all ratings on the centile score are inflated.

#### The Point Allocation Technique (PAT)

This rating system is designed to force relative rating of personnel, in accord with the competitive nature of the promotion action. The comparison of an officer with other officers in his grade is best done at the lowest possible level, if accurate identification of relative potential is to be made.

The Point Allocation Technique (PAT) accepts the premise that selection for successive higher grades has resulted in the necessity to discriminate between highly qualified individuals. This is accomplished through the rating device of providing the rating officer with 100 points for each rating factor for each officer of a given grade whom he will rate in a given cycle.

If there is no detectible difference between officers in their demonstration of a given factor, they receive ratings of 100. As differences can be determined, points are taken from one and given to the other; e.g., values of 95 and 105 might be assigned to two officers who demonstrated a small difference in potential; 90 and 110 would be more striking; 75 and 125 would indicate the presence of a rare and uniquely qualified officer, and conversely, the relatively "slow burners."

Promotion potential, being a comparative quality, should be evaluated in a group of not less than 3 officers. In the case of a rater who has only one or two ratees of a given grade, it is necessary that he go up one echelon to his supervisor, in order that his ratee can be pooled against other ratees of the same grade. These ratees can be officers of the appropriate grade who work directly for the supervisor, or for whom he is the second echelon supervisor. When this occurs, that second echelon supervisor and his subordinate raters, serve as an informal selection board to distribute points among the ratees. This procedure could meet the desire to have promotion potential evaluation accomplished at the lowest possible level, within the constraint of a rating group of not less than 3 officers. It has the possibly disabling flaw that significant percentages of rating officers evaluate only one or two ratees who are in grades identical to their own. A procedure for handling this problem must be developed if this system is to be implemented.

It is recognized that this forces a discrimination between recognized qualities of ratee officers. However, it is pointed out that such discrimination is essential to identification of the best officers for promotion. Historically, promotion boards have recognized the sure promotee and the sure passover very quickly; the difficult decisions occur near the quota cutting point. This system offers the possibility of meaningful discrimination across a rather broad spectrum.

Values distributed in this way would be helpful in the assignment process-- under current standards of evaluations, all officers are highly qualified for all positions.



The rating task under this system would be less comfortable than the current system. It places the rater in the position of having to make discrimination between his subordinates, or penalizing all of them. If a spread of ratings does not appear in the ratee group, it will reduce promotion opportunity for every member of that group.

In order to stabilize the system around a set of meaningful values, and to provide for foreseen management contingencies, the following rules for evaluation are proposed:

. Each rater is allocated 100 points per ratee for each evaluation factor which he is to distribute among his ratees. There will be a minimum of three ratees with an allocation of 300 points.

. If a definitely unsatisfactory officer is in the group, he may be assigned a value of 70 or less; if this occurs, the remainder of the 100 points allocated drops out of the pool. Here is an example of ratings for three officers, one of whom is unsatisfactory:

$$65 + 110 + 90 = 265$$

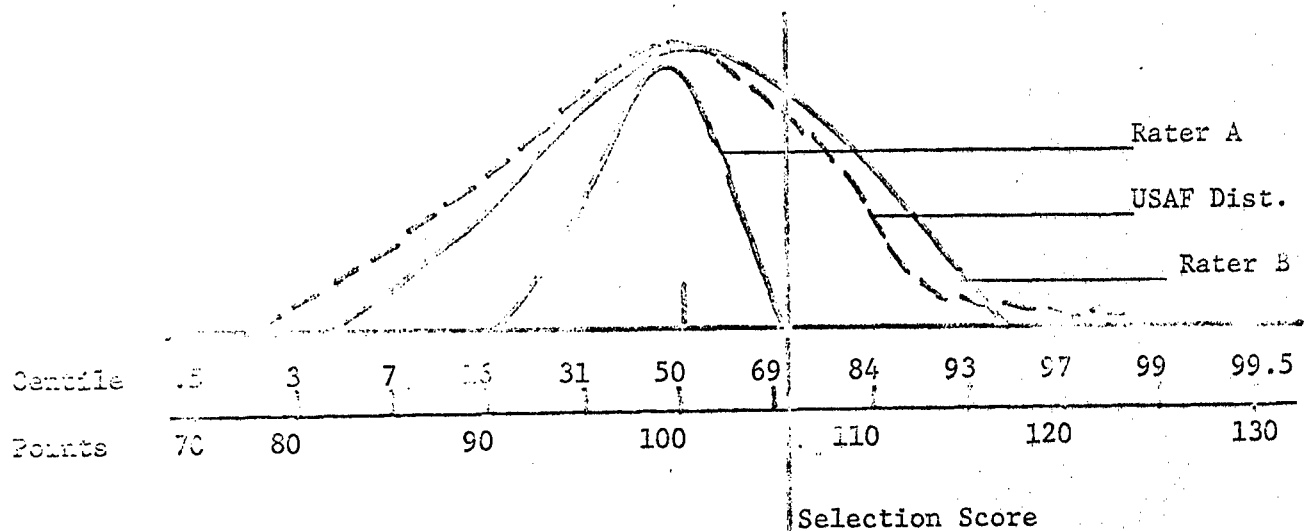
. A rating higher than 130 may not be given. This rule is inserted to prevent grotesque inflation in a rating of group of 12 to 15 officers. It would be possible, by setting the majority of the group just below 100 to produce an inordinately high value for a single ratee. Applied within the limits stated, and insuring that the total number of points allocated is equal to 100 times the number of officers (with an adjustment for points subtracted because of ratings equal to or less than 70), an equitable distribution of ratings will appear.

. Every rating must be discussed with the ratee. This rule is inserted to provide for equity in rating--officers have a recognition of the comparative abilities of their colleagues, and equitable discrimination will not be

offensive. Knowing that each of his ratees must be told the rating given will do a great deal to keep a rating officer objective, and supplying data of maximum value to the Air Force.

. The next higher echelon of supervisor will indorse ratings prepared by his subordinates. Although he may discuss and change ratings given, he should not do so for officers with whom he has insufficient face-to-face contact to be certain of his own knowledge of the relative potentials. A primary function of the indorser is to insure that his subordinates have introduced reasonable variation into their ratings, and that Air Force objectives of distribution of potential to permit fair promotion opportunity throughout the Air Force are met. Of course, the indorser is bound by the same rules as the rater.

. It is essential that the rating officer understand his responsibility to his ratees. If he assigns the standard value of 100 to all of his officers, he will minimize the chances of their promotion, because promotion quotas above about 40 to 60% of the population are rather rare--mean of the Air Force-wide group will be very slightly below 100 because of the presence of men ranked 70 or below who are not counter-balanced by a "high" ratee. The circumstance which will occur is shown in the figure below, which shows the centil equivalent of each point value, as well as a comparison of two raters and an Air Force-wide population. Rater A has given scores of 100 to a majority of his ratees, and Rater B has provided greater discrimination between his ratees.



The system proposed is based upon essentially the rating factors now used in the AF Form 707, Field Grade Officer Effectiveness Report. There are certain recommendations for changes in factors to be evaluated, but the significant difference lies in the conversion to a relative scale, rather than the current scale with its attributes of absolute assessment. Various sections of the proposed system will be addressed below.

The Narrative section of the form is used essentially as in the current system, but emphasizes a requirement of a description of tangible results in terms of the Command mission. Discourage adjectival description of quality of performance.

Evaluation Factors or Elements: These are almost exactly as in current forms and are : (1) Job Capability, appearing on present AF Form 707 is deleted, to be replaced by a different factor, later in the scale; (2) Planning Ability, unchanged in definition; (3) Executive Management, unchanged in definition; (4) Leadership, unchanged in definition; (5) Executive Judgment, unchanged in definition; and (6) Nurturing Professional Development of Subordinates. This is defined in terms of overt activity on the part of the ratee to improve the professional competence of his subordinates and to

contribute to their maximum growth for Air Force service. It is changed from "Human Relations" on the present AF Form 707; (7) Writing Ability, defined as level of skill in preparation of written reports, correspondence, technical material, or office memoranda; (8) Speaking Ability, defined as skill in the communication of ideas in either formal or informal situations; (9) Mission Contribution. This factor is defined in terms of the extent to which the officer has forwarded his unit mission during the reporting period. In this context, it has some relevance to the "Job Capability" factor deleted from the AF Form 707, but goes beyond this to assess the extent to which the officer is oriented to accomplishing the mission of his unit, as opposed to the less complex concept of display of simple job skills; (10) Military Qualities, defined as on AF Form 707; (11) Overall Evaluation, defined as on AF Form 707.

#### How To Test

There would be unacceptable risk of failure in attempting a USAF-wide operational application of any basic changes to the existing system without prior successful testing. Yet, realistic, meaningful testing in a non-operational environment is not possible. Simulation does not give the personal, psychological pressures that exist in the real world and conclusions based on "dry runs" not expected to influence promotion decisions could be misleading, even dangerous.

One suggested approach that we do offer for consideration consists of a limited but real application of the methodologies in two separate organizations (commands). Realism would be provided by prior announcement that results of

evaluations made in the system being tested would be used to distribute that command's fair share of USAF promotion quotas for the year. A separate Promotion Secretariat Panel would be tasked with making such quota allocations within each grade using evaluations from the new system....Some insurance against failure would be provided by requiring continuation of the existing OER system during the test period.

If tests are approved, a test group for each alternative should be set up. Composition should include a general officer head and full time personnel for development of procedures and test implementation from AFDPXO, AFDPMAJA, and AFHRL.

#### SUMMARY OF RECOMMENDATIONS

1. Standardize approach for developing job descriptions. (Hq USAF action).
2. Require definition of job requirement factors using on-the-shelf AFHRL methodology. Forward with description through indorser to assignment and promotion activities (Hq USAF action - AFHRL update).
3. Develop career field oriented job performance evaluation methodology. Output goes through indorser to assignment activity. Ratee counseling is based on this visible form (AFHRL action, after USAF concurrence).
4. Develop methodology to give rater/ratee feedback on recent promotion potential ratings (AFHRL/AFDPMAJA (MPC) actions, after USAF concurrence).
5. Define size of ratee pools under different pool formulation rules (AFHRL action).
6. Select short-run system modifications from alternatives provided on page 10 and in inclosures, as necessary (Hq USAF action).

7. Select methodology for field testing PAT and FRESKA alternatives (Hq USAF).

8. Field test and evaluate PAT alternative (Hq USAF, AFHRL, MAJCOM).

9. Field test and evaluate FRESKA alternative (Hq USAF, AFHRL, MAJCOM).

10. Modify tested methodologies for USAF-wide implementation (AFHRL).

R&D COST ESTIMATES

While precise estimation of costs associated with these recommendations is not yet possible, the following provides indication of magnitudes:

Recommendation	Organic AFHRL Manyyears	Contract (\$K)	R&D Total \$K
1	0	0	0
2	1	0	20
3	1	40	60
4	1	0	20
5	1	0	20
6	0	0	0
7	0	0	0
8	7	15	155
9	7	15	155
10	<u>2</u>	<u>0</u>	<u>40</u>
Totals	20	70	470

USAF EVALUATION SYSTEMS WORKSHOP  
El Tropicano Hotel  
San Antonio, Texas  
25-29 January 1971

Roster of Attendees and Participants

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Sqd Ldr Barrett	RAF (USAFMPC)
Dr Bolda	GM
Dr Bottenberg	AFHRL
Dr Bowles	AFHRL
Dr Brokaw	AFHRL
Dr Christal	AFHRL
Mr Cowan	USCG
LtCol Craig	USA
Dr DeGough	AFHRL
Dr Duel	Hq USAF (AF/DPC)
Dr Fields	ONR
Wing Cdr Funnell	RAAF
Col Grunzke	Hq USAF (AF-DCS/P)
Dr Hahn	AIR
LtCol Hazel	AFHRL
Capt Hoadley	USAFMPC (DPMY)
Capt Howen	Hq USAF (AF-DCS/P)
Dr Hutchinson	AFOSR
Dr Locke	University of Maryland
Col Marsh	USMC
Dr McCormick	Purdue University
Dr McGehee	Fieldcrest Mills
Maj Nordhauser	AFHRL
Cdr Paine	USN
Col Patterson	AFHRL
Mr Robertson	USN
LtCol Savage	USAFMPC
Col Shepard	AFHRL
Dr Richard Smith	Arizona State University
Dr Robert Smith	Kent State University
Maj Taylor	AFSC
Dr Waldkoetter	USA
LtCol Weaver	USA
Maj Wilkinson	AFHRL
Dr Zackert	Medical College of Georgia

## Appendix 2

### USAF Officer Evaluation Workshop 25-29 January 1971

Briefings presented by US Air Force, Army, Navy, Marine Corps, Coast Guard, RAAF/RAF, Industry, and Civil Service Representatives.

- Tab 1. Overview and Purpose of Workshop  
Col James Shepard  
Chief, Personnel Division, AFHRL
- Tab 2. USAF Officer Evaluation System Today &  
Proposed Changes  
Capt Robert Howen  
Hq USAF (DPXO)
- Tab 3. OER in Selection and Promotion (Temporary)  
Systems Procedures  
LtCol William Savage  
USAFMPC (DPMAJA)
- Tab 4. Use of OER in Assignment Decisions and  
Career Counseling  
Capt Bill Hoadley  
USAFMPC (DPMY)
- Tab 5. US Army Officer Evaluation System  
LtCol Francis W Craig  
Hq Dept of Army
- Tab 6. US Navy Officer Evaluation System  
Cdr F. S. Paine, Jr.  
Bureau of Naval Personnel
- Tab 7. US Marine Corps  
Officer Evaluation System  
Col Jim Marsh  
Hq USMC
- Tab 8. US Coast Guard Officer Evaluation System  
Mr Joseph Cowan  
US Coast Guard

- Tab 9. The RAAF Confidential Reporting System  
Wing Cdr R. G. Funnell, RAAF  
(Discussion)  
RAAF and RAF Officer Evaluation System  
Wing Cdr R. G. Funnell, RAAF  
Sqdn Ldr D. W. R. Barrett, RAF
- Tab 10. IBM Executive Evaluation System  
Presented by:  
Major Fred Nordhauser  
Personnel Division, AFHRL  
(Under auspices of Mr P. S. Buttress, IBM  
Harrison, New York)
- Tab 11. General Motors Executive Evaluation System  
Presented by:  
Major Robert Wilkinson  
Personnel Division, AFHRL  
(Under auspices of Mr Robert Chandler and  
Mr Robert Bolda, General Motors Corp,  
Dearborn, Michigan)
- Tab 12. J. C. Penny Executive Evaluation System  
Dr Richard Arvey  
Personnel Decisions, Inc.
- Tab 13. Civil Service Executive Evaluation System  
Dr Henry Duel  
Hq USAF (AF/DPC)

USAF Officer Evaluation System Workshop  
El Tropicano Hotel  
San Antonio, Texas  
25-29 January 1971

Briefing Schedule and Agenda

25 January 1971 (First Day)

0845-0910	Welcome and introduction Colonel George Patterson Commander, AFHRL
0910-1000	Overview and Purpose of Workshop Colonel James J Shepard Chief, Personnel Division, AFHRL
1000-1020	Break
1020-1135	USAF Officer Evaluation System, Today and Proposed Changes Captain Robert Howen Hq USAF (DPXO)
1135-1245	OER in Selection and Promotion (temporary) Systems Procedures LtCol William Savage USAFMPC (DPMAJA)
1245-1345	Lunch
1345-1430	Use of OER in Assignment Decisions and Career Counseling Major Donald C Metz USAFMPC (DPMY)
1430-1520	US Army Officer Evaluation System LtCol Francis W Craig Hq Department of the Army Directorate of Military Personnel Policies
1520-1535	Break
1535-1630	US Navy Officer Evaluation System Commander F. S. Paine, Jr. Bureau of Navy Personnel Fitness Reports Branch

1630-1645 Information/Comments for second day  
Colonel Shepard  
LtCol Hazel

1800- Cocktails and dinner  
Lackland AFB Officers Club

26 January 1971 (Second Day)

0830-0915 US Marine Corps Officer Evaluation System  
Colonel William Marsh  
Hq USMC Arlington Annex

0915-1000 US Coast Guard Officer Evaluation System  
Mr Joseph Cowan  
US Coast Guard Office of Pers Rsch Branch

1000-1015 Break

1015-1100 Royal Australian Air Force Officer Evaluation  
System  
Wing Commander Ray Funnell  
Royal Australian Air Force  
Assigned: USAFMPC (DMRC)

Open Discussion  
RAAF and RAF Officer Evaluation System  
Wing Commander Ray Funnell, RAAF, and  
Sqd Leader D. W. R. Barrett, RAF

1100-1130 IBM Executive Evaluation System  
Major Fred Nordhauser  
Personnel Division, AFHRL  
(Under auspices of Mr P. S. Buttress,  
IBM, Harrison, New York)

1245-1315 General Motors Executive Evaluation System  
Major Robert Wilkinson  
Personnel Division, AFHRL  
(Under auspices of Dr Robert Boldt,  
General Motors Corp,  
Detroit, Michigan)



- 1315-1400 J C Penny Executive Evaluation System  
Dr Richard Arvey  
Personnel Decisions, Inc.
- 1400-1430 Civil Service Executive Evaluation System  
Dr Henry Duel  
Hq USAF (AF/DPC)
- 1430-1445 Break
- 1445-1500 Instructions for Panels  
Explanation of Tasks, Guidelines,  
Considerations  
Colonel James J Shepard  
Personnel Division, AFHRL
- 1500-1630 Panels Assemble  
(Office Space A, B, C, D, and Room 3064  
Third Floor)

27 January 1971 (Third Day)

- 0830-1630 Panel Development of Research Proposals  
(Office Space A, B, C, D, and Room 3064)

28 January 1971 (Fourth Day)

- 0830-1630 Panel Development of Research Prospects  
Preparation of Presentations  
(Office Space A, B, C, D, and Room 3064)

29 January 1971 (Fifth Day)

- 0830-1130 Panel Development of Research Proposals  
Preparation of Presentations
- 1130-1245 Lunch
- 1245-1300 All attendees assemble in River Room (1st Floor).  
Information concerning Review/Critique of Proposals.  
Colonel James J Shepard  
Personnel Division, AFHRL

1300-1415      Brief Presentation of Proposals

1300 - Orange Panel  
1315 - Crimson Panel  
1330 - Maroon Panel  
1345 - Red Panel  
1400 - Scarlet Panel

1415-1500      Panel Chairmen and Executive Coordinators  
Meeting (Hidalgo Room)  
Discussion - Workshop Report Preparation

1500            Workshop Adjourns

COMPUTERIZED EVALUATION SYSTEM: A PROPOSAL

by

Lt Col Robert A. Dineen  
USAF

10 February 1971

Personnel Division  
Air Force Human Resources Laboratory  
Lackland Air Force Base, Texas 78236

Figures:

1. Building the graph
2. Discrimination as a function of time
3. The complete graph
4. Example of five 2Lts and five Majors
5. Example of nine 2Lts and one Captain
6. Example of graph as viewed by Promotion Board
7. Example of graph with control limits

## Computerized Evaluation System: A Proposal

The concept of a Computerized Evaluation System requires radically new thinking on the part of the rater, the ratee, and the endorser. It involves logic which must be transformed into a mathematical model, a model which must in turn be converted into a computer program that is discussed in Appendix A.

The Computerized Evaluation System may appear to be complicated from a mathematical point of view, but the procedure to determine the best and worst officers must be complicated to insure that raters will not "beat the system" as they have in the past. Secondly, it has been historically impossible to reproduce the policy decisions of the promotion board, which in itself is a very complicated process. Therefore, the procedure outlined in this proposal is relatively simple compared to the rationale of the overall promotion board process.

Suppose we continue this discussion and analyze the system from an operational point of view with a look at the rater. The rater receives a sealed envelope from Military Personnel Center. Inside the envelope are twelve IBM cards. The first nine cards are prepunched with the names of the last nine officers rated by the rater. These officers (ratees) may not be of equal rank (in fact, they probably will not be), but this is compensated for and will be explained later. If the rater has not rated officers before, blank cards are used to represent officers of the same rank as the ratee. The rater rank orders the nine cards according to whom he feels was the best officer, second best, third best, and so on. He then inserts in rank order position the next card for the officer currently being evaluated. To insure

that the cards are not rearranged during processing, he writes on each card the rank number. The eleventh card is not prepunched and has room for 80 characters of information about the officer. This card corresponds with the comments section on the current OER form. The ratee may abbreviate, condense or print as much as he can about the officer in these 80 characters (blank spaces between words count as a character). The cards are then taken to the endorser, who examines the ranking of the officers. If he approves, he so indicates by adding his signature to an IBM card (the twelfth) previously signed by the rater and forwards the cards to MPC. If the endorser does not approve, he so indicates and then obtains from MPC a set of cards identifying the last nine officers that he, the endorsing official, rated. The endorser then ranks the ratee relative to these nine officers. Both sets of cards are placed in an envelope which is self-addressed to MPC.

When the cards arrive at MPC, the envelope is opened, the information on the comment card is punched, and the card is placed back in the deck (see Figure A). These cards are then fed into the computer. The computer does statistical analysis on each card; a score is computed for each officer and is stored in the computer. If a set of cards is submitted by an endorser, the overall value for the ratee is adjusted. Note that this system requires very little writing, is completely confidential while the officer is being graded, is efficient, can be started on existing computer equipment at MPC, insures a spread among the officers, and yet gives the officer visibility with respect to his career intentions.

After the ranked cards have been inserted into the computer and the appropriate values computed, a printout is provided to the rater and endorser to insure that the cards were "read" in the correct order. The computed

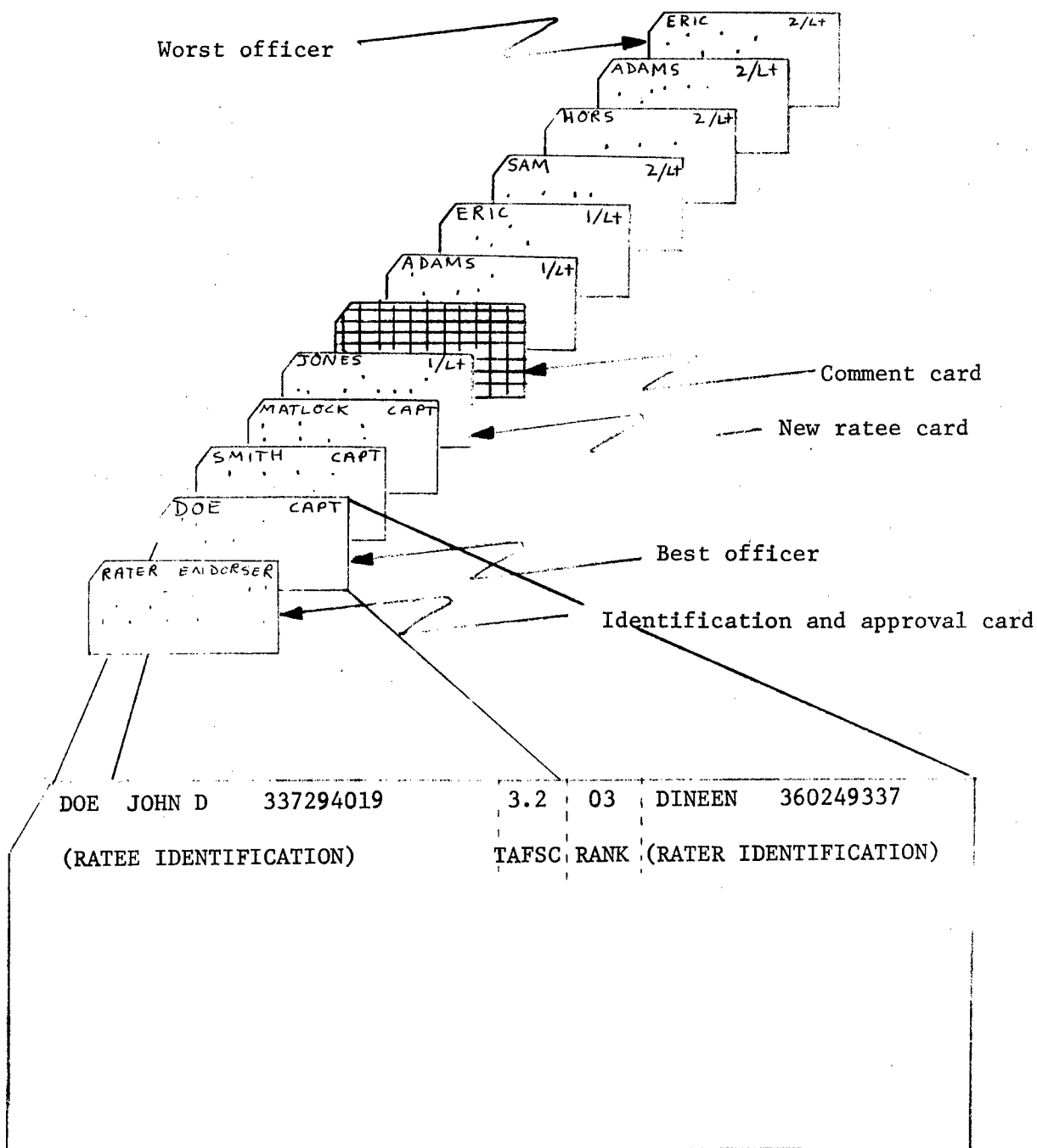


Figure A. Set of Cards as Received by MPC

score will also be furnished to the ratee, rater and endorser.

If an officer is discharged from the Air Force, his records are removed from the promotion file.

There are numerous combinations of rank that can occur within these ten cards. For example, we may have a mixed population of five 2Lts and 5 Majors. A method was developed to logically compensate for the apparent inequities of 2Lts being compared with Majors. This method will be discussed in the Appendices. The fact that an officer may have rated a person five years ago and since that time has forgotten how the officer actually performed is also taken into account. Again, this will be explained in the Appendices.

Other officer combinations are:

- (1) Rater has never rated an officer before.

SOLUTION: Nine blank cards are supplied to the rater and the rater places the ratee where he thinks the ratee would fit in a population of like officers.

- (2) Rater rates the same officer again without rating any other officers.

SOLUTION: The rater receives eight blank cards plus two prepunched cards with the ratee's name. The ratee is now being compared to how well he did in the present rating period versus the last rating period. This process adjusts the first value that the ratee received. When the rater has only one officer to compare over two consecutive reporting periods, the endorser is required to submit a rank order of officers that the endorser has formerly rated. This procedure should decrease the likelihood that the rater inflates the ratee's score because the endorser



has to consider officers that he has rated in the past along with the ratee and rater. If the rater has been "overselling" the ratee, then the ratee may get ranked above the rater in the endorser's ranking selection. This procedure will tend to brake the inflation process when the rater has only one person to rate.

(3) Rater has to rate the same officer for the third consecutive time with no intervening officers.

SOLUTION: The rater receives seven blank cards plus three prepunched cards with the ratee's name. The ratee is now being compared to how well he did during the present rating period versus the last two rating periods. The values given during the first two periods will be adjusted as the third value is entered into the officer's record. The endorser submits a set of cards. The ratee's file now contains the score of the present time period (which carries the most weight) and the scores given during the two previous time periods which are adjusted by formula 2 in the Appendix. This formula considers the length of the reporting period and how long ago the officer was rated (the forgetfulness function).

(4) Rater has at least ten officers of the same grade working for him.

SOLUTION: The rater simply ranks the officers as to whom he thinks is best, second best, and so on until the worst officer.

When a card is submitted on officers who were formerly rated, the initial score that the officer received will be adjusted. It is important to understand that cards submitted after the initial rating only adjust the appropriate score for that time period. In other words, a rater may have second thoughts about the rating that he gave to a former officer and have a

chance to increase or decrease the original value. An example would be that Officer A's record is influenced if he is one of the nine last officers ranked by rater B and rater B now sends in a ranking that includes Officer A. In doing so, the forgetfulness function is mathematically taken into account which "waters down" the impact of the rater going back in time to adjust the score. This method is explained in the Appendices.

The end result is a series of scores that form a trend on how the officer performed with respect to other officers over time. The trend is used by the promotion board to determine who should be promoted.

An important ingredient of this system will be the promotion board which makes the final decision as to who is promoted. The Computerized Evaluation System guarantees that both the "fastburners" and the "slowburners" are spotlighted. During the transition period, the promotion board will have as a part of the officer selection folder a printout showing how the officer was rated in the computerized system. The 80 character comment will be included as a part of this printout, as will some rather elementary statistical analysis (see Appendix A). A printout of the computer report will be sent to the officer at the time of his annual record review so as to give him some degree of visibility. This printout indicates how he stands relative to his year group (see figure 7 in Appendix A).

The next stage in the development of this system would be to build a simulation system to test various officer combinations over time, along with other parameters of the system, i.e., ranking five officers versus ten, other scales, etc. This could be accomplished by the Personnel Division within three months.

A test program could be set up with a finite population (i.e., Wing, Division, Command, etc) in order to obtain feedback from the using commands. This should take about one year. The salable features of this proposal are:

(1) It insures a spread among officers that the rater has formerly rated. This spread is more critical as an officer has more time as a commissioned officer. In fact, the system has a de-inflationary effect because an average officer receives lower ratings as he obtains more time in service. An important feature of this program is the trend of scores that an officer receives over time.

(2) It is simple to operate and tamper-proof.

(3) The system provides that the rating is confidential at the time of the rating, yet gives the officer (ratee) visibility with respect to officers of his same year group. The rating that an officer receives will be contingent upon the other ten officers that he was rated against. Since the ratee is never aware of the population of the nine other officers, this is the trick that insures us that the rating is confidential at the time of the rating. In other words, the ratee who receives a low grade may rationalize that he was working with superior officers and that the rater was "forced" to stack the ratee in a low position.

(4) Maximum use is made of algorithms, statistics, and computers.

(5) The promotion board still makes the final decision based upon a computer printout of:

(a) pertinent Uniform Officer information

(b) graphical trend analysis of how well the officer compared with other officers vying for promotion

(c) short, pertinent comments about the officer correlated to

the scores on the trend line of each officer.

(6) It has several "built-in" quality control devices to assist the promotion board in analyzing a score that is out of statistical limits.

(7) A similar system could be initiated to evaluate airmen.

The average group that raters rated during CY1970 is as follows:

# OFFICERS RATED DURING CY1970

		Ratees						
		2/Lt	1/Lt	Capt	Maj	L/C	Col	Total
Raters	2/Lt	1.3						1.3
	1/Lt	.64	.75					1.4
	Capt	.34	.93	1.05				2.3
	Maj	.16	.73	2.03	.52			3.5
	L/C	.11	.43	1.43	1.39	.47		3.8
	Col	.09	.27	.97	1.1	1.78	1.78	4.9

For example, during CY1970 Captains on the average rated 0.34 2/Lts, 0.93 1/Lts, and 1.05 Captains. Based on these statistics, Captains rated an average of 2.3 officers. Therefore, it would take 4.3 years before Captains would have ten officers in their unique population versus a little more than two years for Colonels. Hence, part of the analysis of this proposal should include the proper population size for each rater grade.

## APPENDIX A

To keep the mathematics at a talking level without going into the details of where the numbers come from, suppose we begin this discussion with a graphical analysis of how we develop the scores. The left hand side of the graph (the ordinate) can be looked upon as a promotion score of sorts and is scaled from 0 to 100. The bottom of the graph (the abscissa) is scaled from 0 to 9 and corresponds with the rank order of cards as they are read by the computer (0 represents the best officer). Now, suppose for the moment that our population is restricted to 2Lts and that we draw a line connecting the upper left corner of the graph with the lower right corner of the graph as in Figure 1. If we then locate on the abscissa the relative position of an officer (relative, that is, to the other nine officers against whom he was rated), project this rating onto the promotion score scale, and repeat this operation for each officer in the population, we will get a distribution of officers along the entire scale. The best 2Lts would have a promotion score of 100 and the worst would have a score of zero. While this would give maximum discrimination between the 2Lts, it would be of little or no value because virtually all 2Lts and 1Lts are 100% qualified for promotion. They should all, therefore, be clustered around the top end of the promotion score scale. We can achieve this more clustered distribution by reducing the slope of our projection line.

In Figure 2, we have decreased the slope of the projection line for 2Lts and have introduced lines for each of the other ranks. As rank increases, so increases our desire to discriminate more carefully between the officers

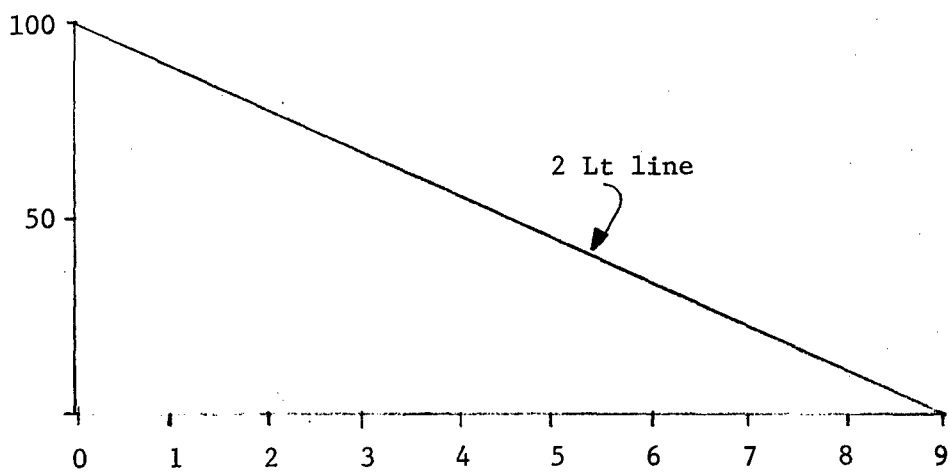


Figure 1. Building the Graph

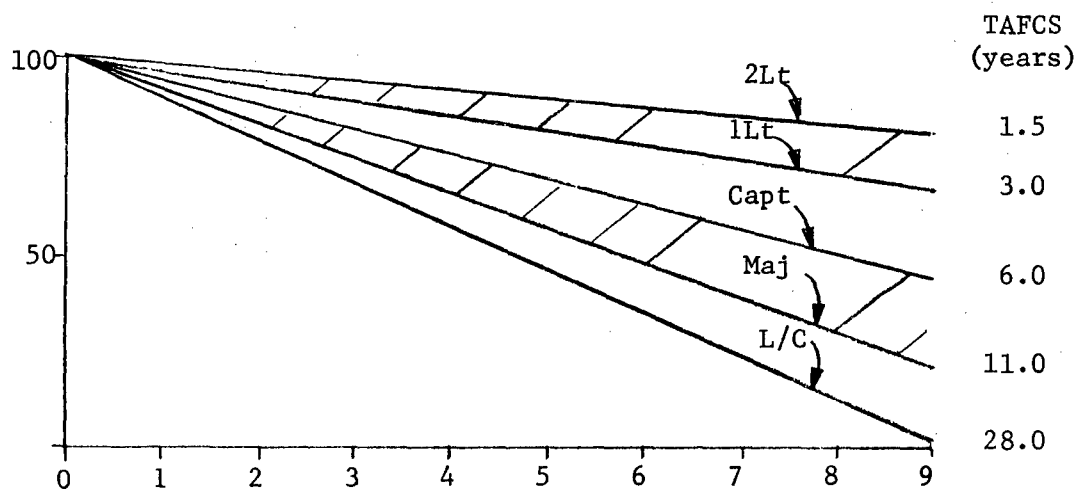


Figure 2. Discrimination as a Function of Time

eligible for promotion. The slope of the projection line for 2Lts is shallow as we are little concerned with discriminating between officers in this group. The slope for Lt Cols with 28 years of service is quite steep in order to insure maximum discrimination. A discriminating factor between officers of the same rank is time in service. That is, eligibility can be related to time in service and vice versa. Total active federal commissioned service (TAFCS) time is included as a third scale in Figure 2. This scale has a range of 0 to 28 years. Twenty-eight years was selected as the bottom end of the scale because a Lt Col who is not promoted to Colonel at 28 years is forced into retirement. Notice also that the values on the right hand side are not equally spaced. The range from 0 to 6 years service time extends over more than fifty points on the promotion score scale; the range of 6 to 28 years covers slightly less than a fifty point spread. This approach gives more of a spread in the early years of the officer's career development. Conversely, there should be little distinction between a Lt Col of 24 to 28 years of service.

There is one more factor needed to complete this graph. That is, we need a way to spotlight the "fastburners." This is done by incorporating a bend near the upper left hand side of the lines that increases as the TAFCS increases. This curve represents a negative exponential curve of the following form:

$$F(x) = 100 e^{-\alpha x} \quad (1)$$

where,

$\alpha$  = constant of proportionality

x = total active federal commissioned service in years.

The completed graph is presented in Figure 3. The mathematics and computer program used to generate the promotion score values are in Appendix C.

An example situation might be useful to help clarify the logic of this graph. Let us take a simple case first where we have all 2Lts with six months of service. Each would be ranked by his rater as best or worst (0 to 9) relative to his peers, and each would be assigned an appropriate score. This would begin early in their career the discrimination between who was the best and who was the worst.

As time progresses and they obtain more time in service, the lines slant increasingly more downward and an increasingly greater degree of discrimination between officers is possible. Eventually, the best officer will be identified as will the worst.

Let us take an example where we have five 2Lts and 5 Majors. The trick is to find a base line where we can equitably measure the differences between Lts and Majors when they are in a mixed population. A base line of Lts and Majors will fall somewhere between the Lt line and the Maj line. The base line is computed from the average years of commissioned service for all ten officers. Using this base line, as in Figure 4, we can see that a value for one Maj and the appropriate base line value is computed. The absolute difference between the two values is found and subtracted from the Major's score. This operation tends to negate the differences between Majors and 2Lts. Conversely, for the 2Lts a value is computed and a corresponding base line value is computed. The



ARBITRARY SCALE

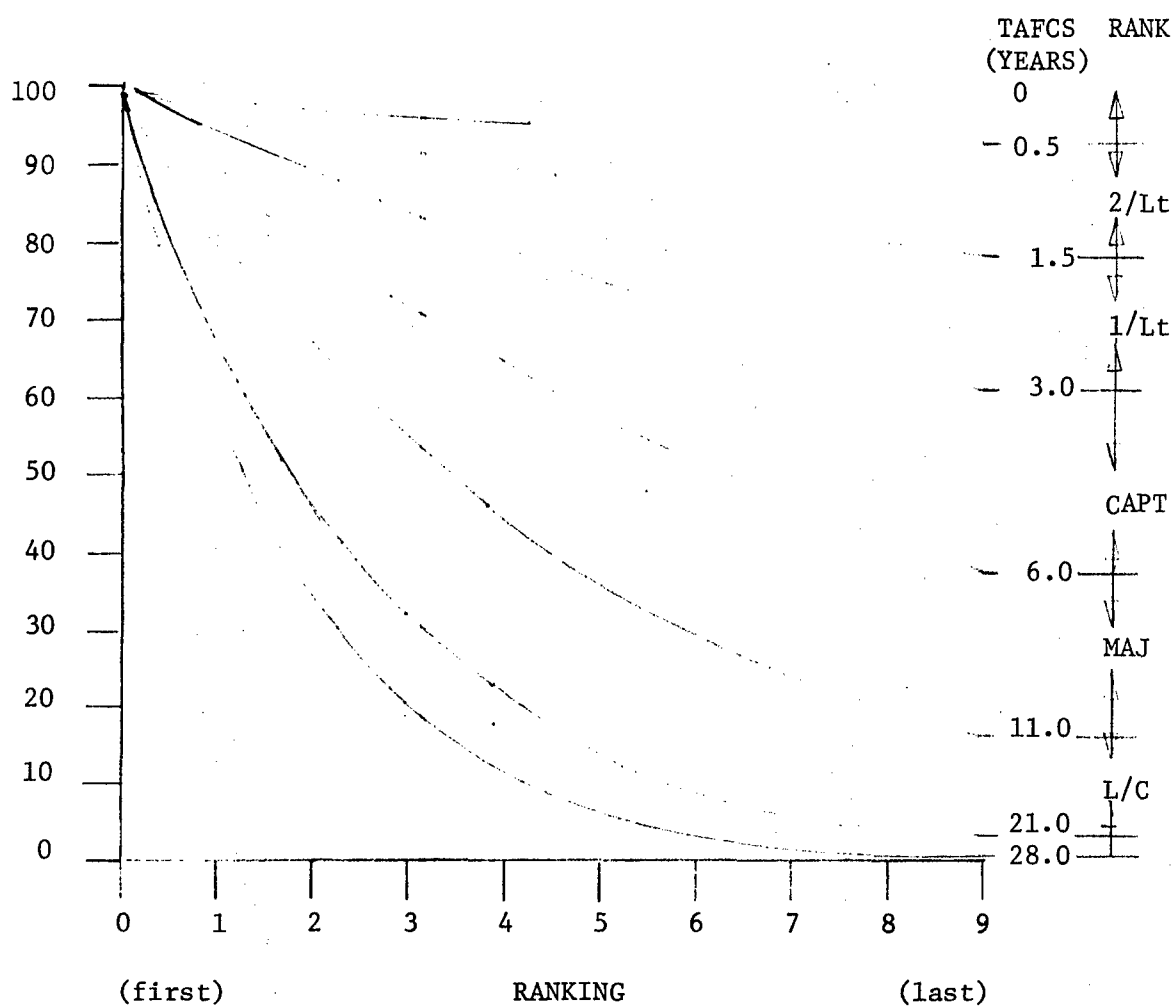


Figure 3. The Complete Graph

difference between these two values is calculated and is added to the 2Lt score (see Figure 4).

One final example will be used to illustrate the point. Let us take a population of nine 2Lts and one Capt. A base line is mathematically computed based on the average TAFCS and the appropriate differences are found. Now, if the Capt were in fact less qualified for promotion than the first two 2Lts, this graphical technique highlights the fact that the captain is less likely to be promoted than the two 2Lts (see Figure 5).

The next problem to be overcome involves a rater who must rank an officer who worked for him five years ago. As time passes, the rater has a tendency to forget how this officer performed relative to the other officers whom he has evaluated. Also, he may have supervised the ratee for a relatively short period of time and this also must be taken into account.

Both problems are solved by weighting the score by the length of time that the ratee was observed by the rater and by the time that has lapsed since the ratee was last managed by the rater. Stated mathematically

$$WSCR = \sum_{\text{all } i} \frac{(TOBS_i * TLAST_i) * SCR_i}{\sum_{\text{all } i} (TOBS_i * TLAST_i)} \quad (2)$$

where,

WSCR = weighted score, which are the values computed for the promotion board

TOBS<sub>i</sub> = time observed (a linear function)

TLAST<sub>i</sub> = time since last observed ( a negative exponential function)

which is explained in Appendix B

SCR = the adjusted score that an officer receives based on his ranking order and time in service relative to the population of ten officers.

$\sum_{\text{all } i}$  = sum over all values that the officer received during any one period of time.

Therefore, in computing an individual's final score, two factors are taken into consideration:

- (1) time that the officer worked for the rater; and
- (2) the lapsed time since he last worked for him.

NOTE: That the rater may have the opportunity to go back in time and adjust the original score that he gave the ratee.

Now, how do we protect the individual officer as he is rated? Does he have the opportunity to administratively remove OERs? The answer is "No!" What will happen is that all these values form a trend such as Figure 6. If the person is an average officer, he will have a downward slope in the graph. A statistical quality control device will be built into the system such that if an OER score falls outside of some statistically controlled limits - that value would not be considered. In other words, if this officer was getting good OERs but suddenly he received a bad OER which fell outside of some specified statistical limits, that value would be coded as such and it would stay in the officer's file. In other words, there is no way that an OER can be administratively removed. However, it can be qualified as to its worth.

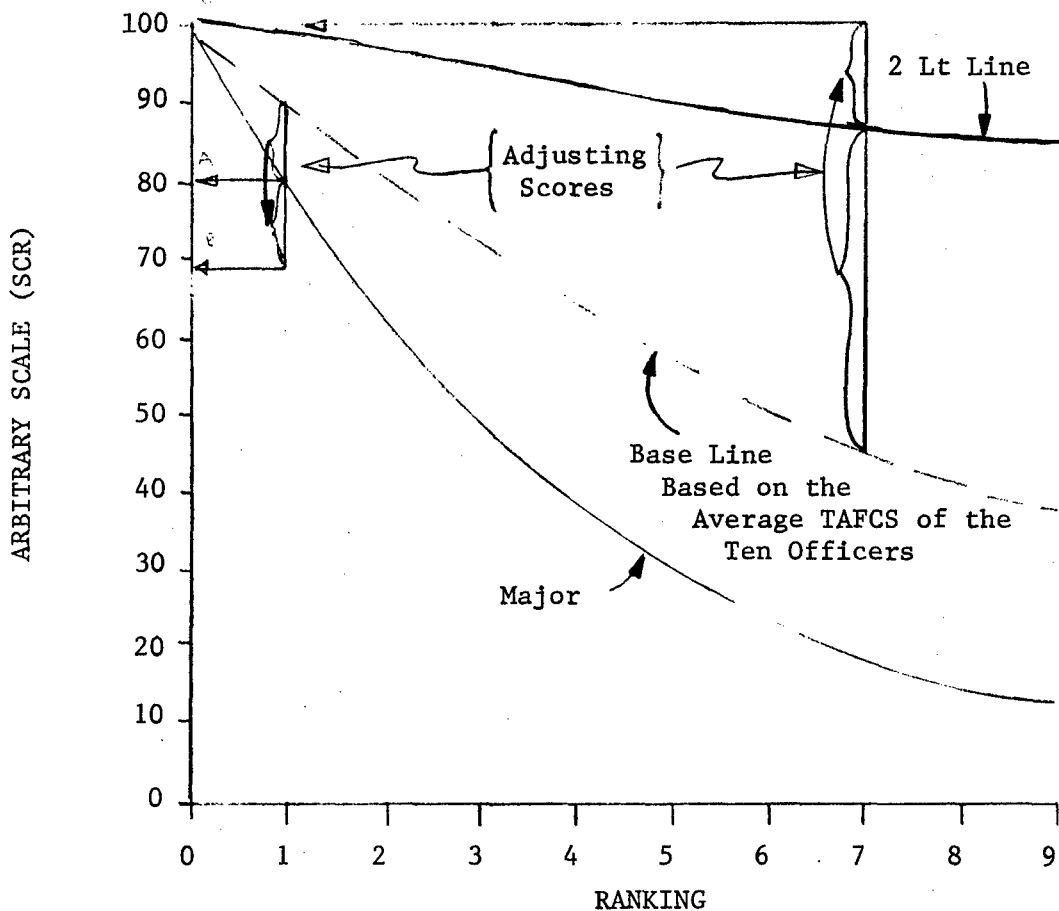


Figure 4. Example of Five 2Lts and Five Majors.

Score A: Officer who was ranked second would receive this score if he were measured against other officers with same TAFCS.

Score B: Officer receives adjusted score because he was measured against a mixed population of Majors and 2Lts.

Score C: 2Lt who was ranked seventh received an upward adjusted score because he was measured against a population of Majors and 2Lts. The maximum score that he could receive is 100.

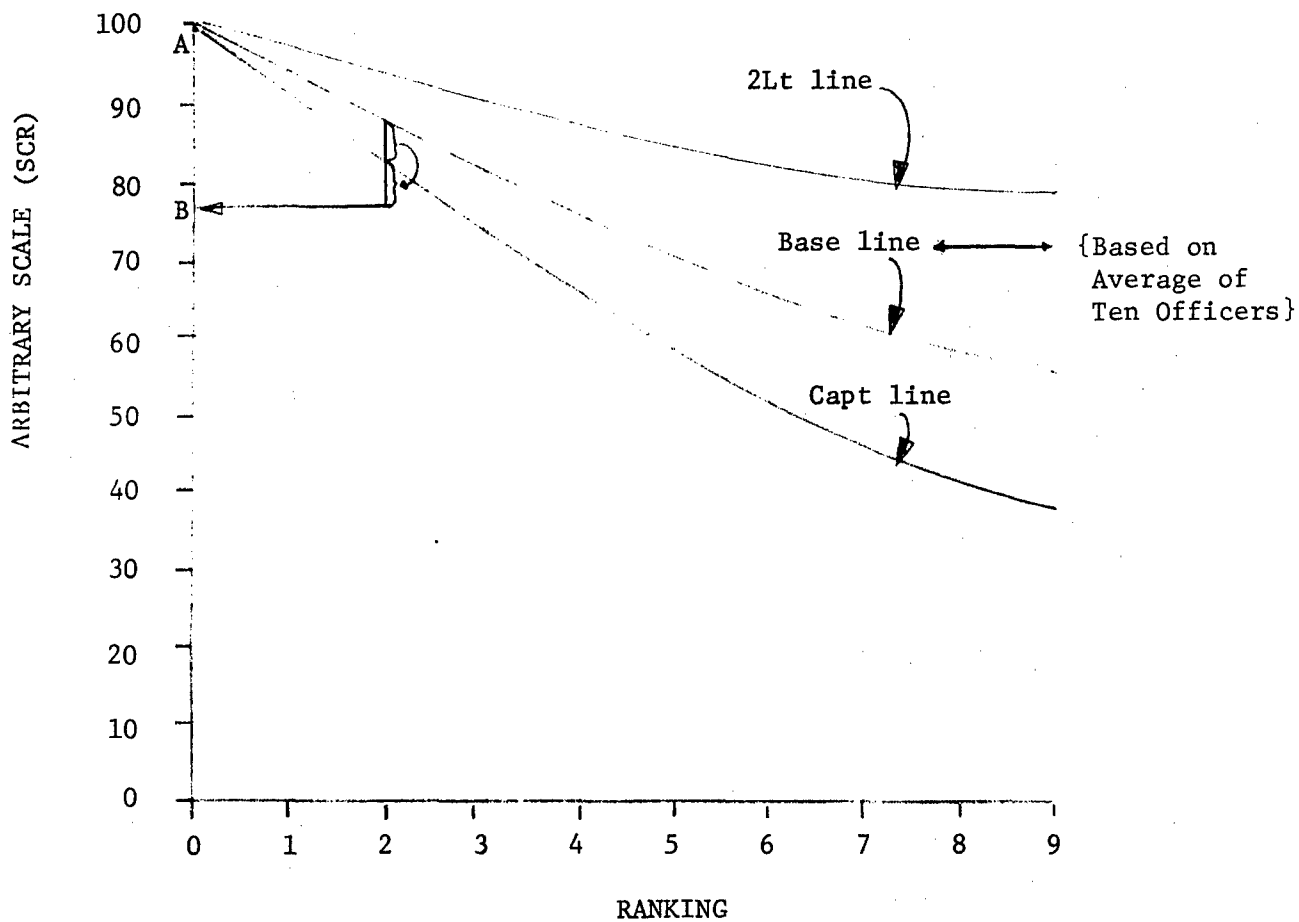


Figure 5. Example of nine 2Lt's and one Capt

Score A: Value that the officer would have received if he was better than the 2Lt's.

B: Value that the officer received because 2Lt's were better than the Captain.

NOTE: These values come from Equation (2).

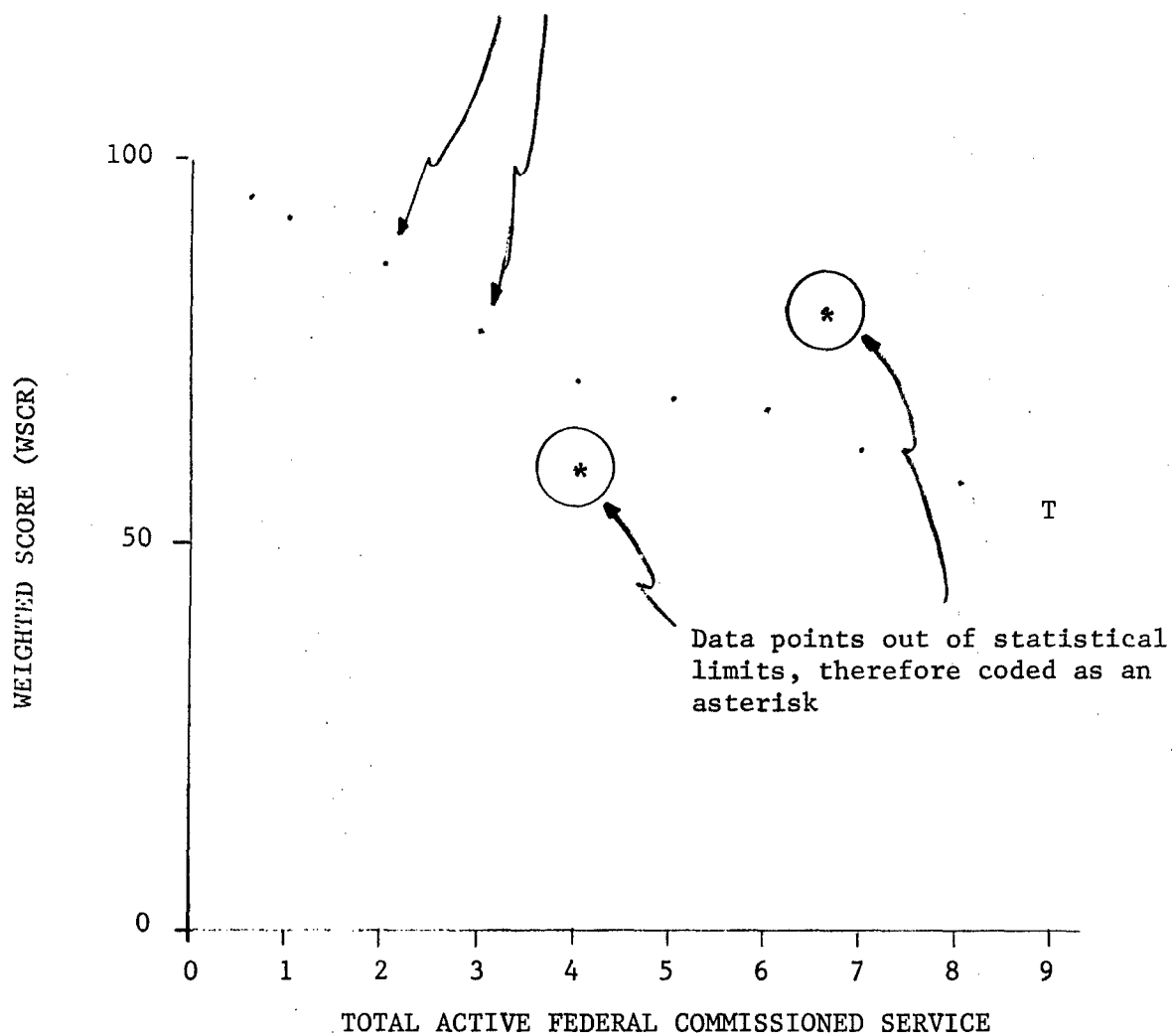


Figure 6. Example of Graph as Viewed by Promotion Board

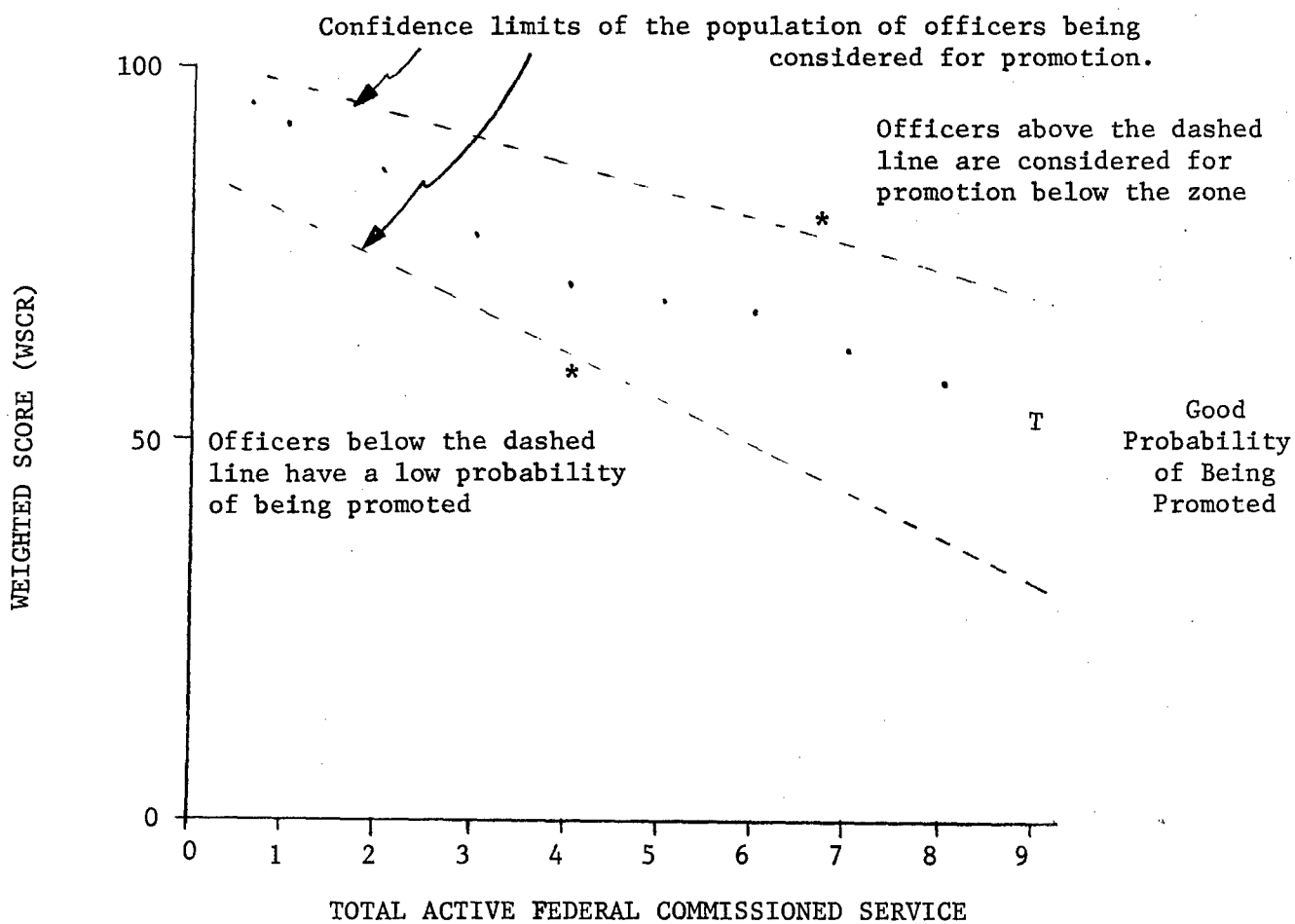


Figure 7. Example of Graph with Control Limits  
As Viewed by the Promotion Board

The last portion of this system is a graph that would be printed by the computer on each individual officer before the information is presented to the Selection Board Secretariat. The graph, such as in Figure 7, would have control limits which show where the population of the group of officers being considered for selection should lie. If an officer's trend line is above the line, he is a superior officer. Conversely, if he is below the line, he is a poor performer. The asterisks on the graph indicate that the value was outside the control limits of the individual officer's values. A 'T' indicates a training report was submitted. It is placed where a forecasting routine computed what the officer's next value should be.

Other products available to the Promotion Board would be a Uniform Officer Record printout and eighty character comments associated with each score.



## APPENDIX B

### Forgetfulness function

Given: We forget by a negative exponential function of the form

$$f(x) = e^{-\alpha x}$$

where,  $x$  is time in years

$\alpha$  is a constant of proportion

Assume: That at the end of ten years we remember 15% of what a rater originally knew about a ratee.

Find:  $\alpha$

Solution:

$$0.15 = e^{-\alpha 10}$$

$$\ln 0.15 = -10\alpha \ln e$$

$$-1.897 = -10\alpha$$

$$\alpha = 1.897/10$$

$$= \underline{\underline{0.1897}}$$

$$f(x) = e^{-0.1897x}$$

## APPENDIX C

Computer Program to compute values for graph.

### Example Problem

#### Given:

An officer with Total Active Federal Commissioned Service (TAFCS) of six years, is ranked fourth in a population of ten officers and his unique population of ten officers has an average TAFCS of 11.0 years.

#### Find:

His initial score based on TAFCS and ranked position relative to his population.

#### Assume:

That the more time an officer has in service, the less discrimination is given to his performance. Let us say that his performance is assigned an arbitrary value between 0 and 100, and that the relationship between the performance value and the years that he has in service is a negative exponential function of the following form:

$$f(z) = 100e^{-\beta z} \quad (C1)$$

where,

$f(z)$  = an arbitrary scale from 0 to 100

$\beta$  = constant

$z$  = years of service.

Since the definition of the function on the right hand side approaches zero asymptotically, we assign a value of one on the arbitrary scale for an officer with 28 TAFCS years of service who is ranked last. We can now state that:

$$f(z) = f(28) = 1 = 100e^{-\beta 28}$$

Solving for Beta yields 0.164. Therefore,

$$f(z) = 100e^{-0.164z} \quad (C2)$$

Now, for any officer's TAFCS who is ranked last, we can determine his score from the above equation.

In order to define the particular function for an officer that has a TAFCS of six years and is ranked fourth, we first find his value as if he were ranked last from equation C2 and set the computed value equal to the following ranking equation, or

$$f(r) = 100e^{-\alpha r} \quad (C3)$$

where;

$f(r)$  = the arbitrary scale from 0 to 100  
 $\alpha$  = constant to be determined  
 $r$  = the ranked position.

For our particular case, an officer with six TAFCS years and ranked last (or ninth, on a 0-9 scale) receives a score of 37.277. Stated mathematically

$$f(9) = 100e^{-\alpha 9} = 37.277$$

and solving the equation for Alpha, we find that

$$\alpha = 0.011.$$

Therefore, the equation which defines an officer with six TAFCS is of the following form:

$$f(r) = 100e^{-0.011r} \quad (C4)$$

Since the particular officer was ranked fourth, we adjust the ranking order (because the scale is from 0 to 9) and solve the following equation:

where;

$$f(r-1) = 100e^{-0.011(r-1)}$$

or,

$$f(3) = 71.97$$

We now compute the constant associated with the average TAFCS of the population. That is, we use equation C2 where  $z$  is equal to 11.0. This yields an Alpha value of 0.201 and a ranking value of 54.72. Computing the absolute difference between the officer's score and the population yields,

$$71.97 - 54.72 = 17.25$$

By adding 17.25 onto the 71.97 value obtained when the officer had six years of service, we compensate for an officer that has less TAFCS than his population that he was judged against.

Although the system appears to be complicated, it reduces to about six lines of FORTRAN statements.

FLOATZANDX  
ISN

FORTAN SOURCE LIST

01/21

SOURCE STATEMENT

```

0 $IBFTC FLTZ
1 CALL SXEOR(III)
2 ASSIGN I6901 TO III
3 DIMENSION FZ(9)
4 HUNDRD = 100.0
5 ALG100 = 4.605
6 BETA = 4.605 / 28.0
7 JECT = 0
10 10 READ 1, X, TWO, THREE
11 1 FORMAT(3F6.0)
12 IF(TWO.NE. 0.0) BETA = TWO / THREE
15 IF(TWO.NE. 0.0) ALG100 = TWO
20 FX = HUNDRD / EXP(BETA * X)
21 ALPHA = (ALG100 - ALOG(FX)) / 9.0
22 IF(JECT - 15)11,12,12
23 12 PRINT 9
24 9 FORMAT('1')
25 11 PRINT 2, X, ALPHA, BETA, FX, ALG100
26 2 FORMAT(' X=',F6.1, ' ALPHA=',F8.3, ' BETA=',F8.3, ' FX=',F10.3,
1' ALG100=',F8.3)
27 DO 30 K = 1,9
30 Z = K
31 30 FZ(K) = HUNDRD / EXP(ALPHA * Z)
33 PRINT 3, (FZ(K),K = 1,9)
40 3 FORMAT(' FZ=',9(2X,F8.2),/)
41 JECT = JECT + 1
42 GO TO 10
43 I6901 STOP
44 END

```

FLOATZANDX

IBMAP ASSEMBLY FLTZ

01/21

NO MESSAGES FOR ABOVE ASSEMBLY

X= 0.5 ALPHA=

FZ= 0.009 BETA= 0.164 FX=

99.09 98.19 97.30 96.42

92.106 ALG100= 4.605

92.97 92.12

95.54 94.68 93.82

X= 1.5 ALPHA=

FZ= 0.027 BETA= 0.164 FX=

97.30 94.67 92.11 89.62

78.138 ALG100= 4.605

80.32 78.15

87.20 84.84 82.55

X= 3.0 ALPHA=

FZ= 0.055 BETA= 0.164 FX=

94.07 89.62 84.84 80.32

61.055 ALG100= 4.605

64.51 61.07

76.03 71.98 68.14

X= 6.0 ALPHA=

FZ= 0.110 BETA= 0.164 FX=

89.62 80.31 71.97 64.50

37.277 ALG100= 4.605

41.60 37.28

57.80 51.80 46.42

X= 11.0 ALPHA=

FZ= 0.201 BETA= 0.164 FX=

81.79 66.90 54.72 44.75

16.380 ALG100= 4.605

20.03 16.38

36.61 29.94 24.49

X= 21.0 ALPHA=

FZ= 0.384 BETA= 0.164 FX=

63.13 46.42 31.63 21.55

3.163 ALG100= 4.605

4.64 3.16

14.68 10.00 6.81

X= 28.0 ALPHA=

FZ= 0.512 BETA= 0.164 FX=

59.95 35.94 21.55 12.92

1.000 ALG100= 4.605

1.67 1.00

7.74 4.64 2.78

X= 0.5 ALPHA=

FZ= 0.010 BETA= 0.165 FX=

99.04 98.08 97.14 96.20

92.098 ALG100= 4.610

92.55 91.65

95.27 94.36 93.45

# **Development of Benchmark Scales for Air Force Officer Position Evaluation**

By

**Leland D. Brokaw**

**M. Joyce Georgia**

Distribution of this document is unlimited.

**PERSONNEL RESEARCH LABORATORY  
AEROSPACE MEDICAL DIVISION  
AIR FORCE SYSTEMS COMMAND  
Lackland Air Force Base, Texas**

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HOPE DE LA CRUZ



**DEVELOPMENT OF BENCHMARK SCALES FOR AIR FORCE  
OFFICER POSITION EVALUATION**

**By**  
**Leland D. Brokaw**  
**M. Joyce Giorgia**

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Lackland Air Force Base, Texas**

## FOREWORD

The study described in this report was accomplished under Project 7734, Development of Methods for Describing, Evaluating, and Structuring Air Force Occupations; Task 773402, Development and Appraisal of Methods for Job Evaluation. It supports in part Requirement for Personnel Research 65-17, "Job Evaluation Research." Special recognition is granted MSgt Douglas K. Cowan for the excellence of his accomplishment of the data collection through mailout procedures. His initiative and attention to detail in this matter have contributed significantly to the quality of the research.

This report has been reviewed and is approved.

James H. Ritter, Colonel USAF  
Commander

## ABSTRACT

This study provides a refinement of the procedures previously developed for the determination of the appropriate distribution of officer grades for the Air Force to permit application of the same position evaluation procedures to individual officer positions. A scale of benchmark jobs with titles of established successive levels of requirements was used to derive a set of job requirement factor scales. These scales were applied to 1000 Air Force officer position descriptions collected and previously applied in the Officer Grade Requirements Study. Comparison of rating distributions based upon adjective scales and the benchmark scales revealed lower mean values, larger standard deviations, and superior zero-order validity of the ratings based on the benchmark scales. The predictive efficiency of optimal composites of the benchmark scales was equivalent to that of the adjective scales. A set of integer weights for use in field application of the equations was derived without significant loss of validity.

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## DEVELOPMENT OF BENCHMARK SCALES FOR AIR FORCE OFFICER POSITION EVALUATION

### I. INTRODUCTION

The United States Air Force, like many industries, has a position evaluation program based upon rating systems involving job requirement factors. Several methods of applying such ratings have evolved, but most of them pivot on some system of point evaluation with reference to established jobs. (Madden & Giorgia, 1961)

The intervals of scales used in description of these requirement factors are variously defined. In some scales simple adjective definitions ranging from a very small to a very large requirement, associated with a numeric value, are used; in others, longer descriptions attempt to illustrate the functions of a factor at various scale levels. The official Air Force procedure cited in AFM 35-2, *Occupational Analysis*, dated 10 January 1963, follows the latter procedure.

The Air Force has completed an overall study of appropriate grade level for Air Force Officers. This Officer Grade Requirements study (OGR) has been reported by Christal (1965) and Hazel (1965). The study involved ten job requirement factors rated on a simple adjective scale and a large number of background variables. It was designed to provide content-based determination of appropriate grade for officer jobs, to provide guidance as to the proper distribution of grades throughout the Air Force. The current study is intended to refine the system until it can be applied to single positions for manning document purposes.

In the OGR study a Headquarters USAF board established the proper grade for a representative sample of officer jobs. Raters throughout the Air Force judged appropriate levels on the job requirement factors and grade level appropriate to these jobs. A multiple linear regression model was applied to determine the optimal variables for effective determination of appropriate grade as established by the board.

Five of the ten requirement factors for which data were collected under this study gained places in the final regression equation. This might have been anticipated in the light of Madden's findings that appropriate pay is predicted by factors different from those predictive of appropriate grade (1963). Factors appropriate to both pay and grade were included in the Officer Grade Requirements study, because the capability to evaluate appropriate pay, as well as grade, was desired.

The ratings based on the adjective scales have acceptable validity, as demonstrated by Christal's positive findings in the OGR study; but it is noted that the distributions of ratings granted by these scales are narrow of variance, with the median and low values of scales infrequently used.

Levels of ratings assigned to a given job are subject to the context in which ratings are made. As reported by Madden in 1960, the same position which is evaluated in a context of "low" positions as "high," in a context of "high" positions, will be rated "low." Only by rating in a mixed context can stable ratings of appropriate level be achieved.

The present study is based upon the hypothesis that application of a factor rating scale in which the levels were characterized by the titles of Air Force jobs familiar to rating officers would both broaden the distributions of ratings given and eliminate the context effects.

## II. PROCEDURE

This study proceeds through three major phases which will be detailed below. The first of these encompasses the development of benchmark scales, composed of job titles on which there is maximal agreement among Air Force officers as to level of requirement for each of the ten factors. The second step involves the collection of job evaluations in terms of those factors for a sizeable number of jobs on which firm information as to appropriate grade and relative factor ratings is available. The third step involves digestion of the rating data to establish its predictive efficiency for the appropriate grade levels and to establish the procedures that might be used in the field for determination of proper grades for officer positions.

### Identification of Benchmark Position Titles

The identification of job titles on which substantial agreement exists among Air Force officers as to level on each of the ten job requirement factors used in the OGR study was the first step of this research. Data existed as to field ratings by officers in grade of major or lieutenant colonel for each of a total of 11,789 jobs. These jobs, on the basis of descriptions submitted by incumbents, had been evaluated by five to seven rating officers each. Lists were obtained which indicated the mean and standard deviations of ratings given each job on each factor.

It had been decided that the final scales would involve nine levels; for this reason the list of 11,789 jobs for each factor was divided into nine equal sections, ordered from high to low on mean ratings given. Eleven job titles were selected from each of these nine groups of titles. They were selected to have minimum standard deviations and were so selected as to emphasize the range of ratings given. That is, for the fifth, or median group, the eleven titles were selected as near center of the range of means involved as possible; for groups other than the fifth, titles were chosen from the portion of the range remote from the median. This had the effect of identifying the highest possible mean rating for titles for use as the top or "9" category, and the lowest possible mean rating for titles for use as the lowest or "1" category.

Each of the 99 titles accompanied by the organizational designation and geographical location for each factor was reproduced on a manila card. Decks of such 99 titles were sent to volunteer rating officers in the grade of major and lieutenant colonel, whose task was to arrange the titles in order in terms of their requirement for the factor for which they had been identified. Each rating officer was concerned with one factor for a single group of 99 job titles. The ratings of job titles were required to establish the value of the title in the absence of its detailed job description.

At such time as 15 ratings for a given factor had been collected, the intraclass correlation of the ratings across the 15 raters for the 99 jobs was determined (Haggard, 1958, Chapter VIII). When a value in excess of .92 was obtained, the ratings were accepted as sufficiently stable for use. If lesser reliability was indicated, additional cases were collected. The addition of cases for some factors did not improve the reliabilities obtained; in these cases application of a simple clustering technique revealed the presence of divergent policies on the part of rating officers. In each instance an "aircrew" bias was present, in which the rankings given by rated personnel differed from rankings given by non-rated personnel.

Tests for bias in the Officer Grade Requirements study previously cited had revealed no systematic relationship between the aircrew or non-aircrew category of rating officer and the final grade ratings made. On this basis it was judged that policy differences in factor ratings should be resolved by acceptance of the policy which was most nearly in accord with the factor level determinations of the OGR study. The rank ordering on the factor in question for the set

of 99 jobs in the original 11,789 job sample was introduced into the data received from the field raters and the clustering accomplished. In each such instance the OGR ordering was highly related to one of the policy clusters, and that cluster was chosen to serve as the base for the final ordering of jobs for the scale definitions. When this action was taken, and the intraclass correlation computed across the cases so identified, the reliability value for the ranking of all factors was raised above the .92 level. The values obtained appear in Table 1.

Table 1. Intraclass Correlations of Factor Ratings  
Across 99 Selected Job Titles

Factor	Number of Ratings	Intraclass Correlation
1 Formal Education	15	.92
2 Special Training & Work Experience	9	.96
3 Working Conditions	15	.92
4 Originality, Ingenuity, & Creativeness	10	.94
5 Communication Skills	11	.94
6 Interpersonal Skills	11	.94
7 Judgment & Decision Making	11	.95
8 Planning	15	.92
9 Management	9	.95
10 Risk	15	.96

Each set of 99 job titles as ordered by the mean ranking was subdivided into 9 groups of 11 titles each. The three jobs with ratings of smallest variance in each subgroup were chosen for inclusion in the list of 27 titles composing the benchmark list for each factor. When the 27 had been so identified, the derived lists were reviewed. In a number of cases titles of slightly greater variance were substituted for titles identified as less variant.

This was done primarily to reduce the redundancy of titles in the scale—certain similar job titles were given identical ratings; different kinds of jobs were inserted to make the lists more heterogeneous. In certain factor areas it was not possible to eliminate all such redundancy—there is no doubt, for instance, of the universal agreement that certain types of pilot jobs belong at the top of the "Risk" scale.

Although ordering data for the job titles had been collected in a context of organizational identification and geographical address, it was discovered that certain security regulations would be involved in their publication as such. For this reason the specific organizational identification was altered to indicate a type of organization, and the geographical address either deleted or changed to a general designator, such as "overseas" when the final benchmark lists were prepared. The scales and instructions for the ten factors appear as Appendix I.

### Collection of Job Evaluations

The benchmark lists were circulated to volunteer rating officers in the grade of major and lieutenant colonel, each of whom evaluated five job descriptions, selected from the criterion sample of 3,575 jobs evaluated in the Officer Grade Requirements study. One thousand such jobs were evaluated, with circulation to seven or more rating officers for each packet of five, and ratings were obtained for nearly all the jobs from not less than five raters each.

The thousand jobs used were selected from a subsample of 1,700 jobs which had been re-rated in the second phase of the Officer Grade Requirements study, when the base of 3,575 jobs was broadened to 11,789 jobs as a suitable sample for making Air Force-wide projections (Christal, 1965).

This extensive information from three sets of rating data permitted the establishment of stability over time of ratings on the ten factors, albeit on the most recent study the scale for the ratings had been altered.

The rate-re-rate correlations across the three rating occasions, with the means and standard deviations for the ten factors and the grade level are presented in Table 2. These correlations are indicators of stability over time and are found to be of the order usually associated with aptitude tests, ranging from .60 to .92 among the factors, with a median near .75. The grade ratings were less variable, with the lowest value at .88 and the highest at .91. These values tend to agree with the consistency suggested by the intraclass correlations derived at the time the scales were assembled and are as stable as many personnel management measurements.

Inspection of the distribution statistics in Table 2 shows that most of the mean values for the benchmark scales applied to the factors were lower than the values from the two ratings of the adjective scales but that large differences appeared in the standard deviations of the distributions of mean ratings. It will be noted that the standard deviations associated with the benchmark scales are greater than for the other two rating occasions for each factor, in some cases twice as large. This confirms that the intent to flatten the distributions of ratings has been achieved.

#### **The Predictive Efficiency of the Benchmark Scales**

The zero-order correlations of the benchmark scale factor ratings with the criterion board mean rating were significantly higher for almost all the factors than the correlations obtained with the other sets of adjective ratings. The correlation of the mean grade rating, obtained at the time of the benchmark scale rating, with the criterion board mean was slightly lower than in the projection sample administration and significantly lower than in the original validation sample. These data are reported in Table 3.

The multiple validity of the background variables selected for use in the Officer Grade Requirements study, the supervisor's judgment of the appropriate grade for the job, and the ten factors as rated in each of the three situations was derived to assess the gain or loss in predictive efficiency from the shift to the benchmark scaling technique. Although there is a statistically significant loss from the value obtained in the equation development sample (Time 1), there is no significant difference between the benchmark scale validity and that derived from the adjective scale at Time 2. These data, indicating which of the variables received zero and non-zero regression weights, and the multiple correlations appear in Table 4. The complete list of variables, their description, and their intercorrelations appear in Appendix II.

Because there had been policy differences between aircrew and non-aircrew raters in the ordering of the job title scales for certain factors, analyses were run to determine if systematic differences in the evaluation of aircrew positions and non-aircrew jobs occurred. In the OGR study dramatic changes in grade distributions in the scientific and development engineering utilization fields were recommended. For this reason both this area and the aircrew area were treated to seek systematic differences in predictive efficiency. It was found that slight changes in the level of predictive efficiency occurred when categorical variables relating to membership in the scientific and engineering career fields were studied but that the aircrew variable carried no effect. These data appear in Table 5.



Table 2. Correlations Between, Means, and Standard Deviations of Ten  
Job Requirement Rating Factors and Field Grade Rating Across  
Three Rating Occasions

(N = 996 jobs)

Factor	Time <sup>a</sup>				Means			Standard Deviations		
	3 vs 2	3 vs 1	2 vs 1		T3	T2	T1	T3	T2	T1
1 Formal Education	.79	.84	.83		5.16	5.77	5.71	1.63	1.04	1.01
2 Special Training & Work Experience	.60	.66	.60		5.80	6.26	6.22	1.42	0.80	0.72
3 Working Conditions	.77	.84	.78		5.21	5.16	5.15	1.76	1.27	1.18
4 Originality, Ingenuity, & Creativeness	.71	.77	.73		5.14	5.43	5.37	1.64	1.03	0.99
5 Communication Skills	.79	.83	.80		5.30	5.94	5.81	1.83	1.11	1.08
6 Interpersonal Skills	.72	.77	.76		5.58	5.95	5.89	1.71	0.99	0.94
7 Judgment & Decision Making	.62	.67	.63		5.41	6.00	5.87	1.63	0.95	0.91
8 Planning	.73	.79	.72		5.25	5.83	5.71	1.72	1.08	1.03
9 Management	.77	.83	.80		5.21	5.63	5.54	1.86	1.20	1.17
10 Risk	.90	.93	.90		4.48	4.32	4.34	2.52	2.04	1.96
11 Mean Grade Rating	.88	.91	.90		7.88	7.85	7.66	2.95	2.76	2.71

<sup>a</sup> Time 3 = Benchmark Scales, ratings collected Oct 65 through Feb 66.

Time 2 = OGR Projection Sample, adjective scale, ratings collected Oct through Dec 64.

Time 1 = OGR Equation Development Sample, adjective scale, ratings collected Jan through Mar 64.

Table 3. Correlations Between Mean Factor and Grade Ratings  
and OGR Criterion Board Action

( N = 996 )

Factor	Benchmark Scale	OGR Projection Sample	OGR Validation Sample
1 Formal Education	.61	.46**	.47**
2 Special Training & Work Experience	.61	.43**	.44**
3 Working Conditions	-.03	-.08	-.05
4 Originality, Ingenuity, & Creativeness	.67	.52**	.56**
5 Communication Skills	.72	.61**	.64**
6 Interpersonal Skills	.69	.56**	.59**
7 Judgment & Decision Making	.75	.53**	.59**
8 Planning	.76	.63**	.73
9 Management	.79	.71**	.78
10 Risk	-.22	-.27	-.27
11 Mean Grade Rating	.86	.88*	.90**

\*\* Value different from that obtained for Benchmark Scale at .01 level of confidence.

\* Value different from that obtained for Benchmark Scale at .05 level of confidence.

For convenience in possible hand computation, if applied as a field procedure, it was decided that final grade determination should be based upon composite scores composed of the factor ratings, the background or assignment variables, the supervisory judgment of appropriate grade, and the mean grade rating as assigned in the field. Only those factors selected for the projection equation in the OGR study were included. In treating the three rating samples separately, it was found that the level of predictive efficiency did not deteriorate from that possible with the full set. These data are in Table 6.

Discovery that the predictive efficiency of the benchmark scales was not significantly different from that of the OGR equation used for the projection values supported the decision to develop a system suitable for hand application by manpower officials throughout the Air Force. To facilitate hand application, the variables reported in Table 6 were treated to produce integer weights. Weights to be used were determined by dividing the regression weights in each subcomposite by the smallest regression weight derived for that subcomposite. To further simplify hand processing, the organizational level variables and supervisor's judgment of appropriate grade were set up in a two-step process, with the proper weight first applied to the data from the background data and history sheet, and the resultant data then weighted into the final equation. The integer weights for organizational level and supervisory judgment subcomposites appear in Table 7.

The values derived from these composites are combined with the evaluations of the factors and grade ratings as obtained from the field by use of the integer weights reported in Table 8. The predictive efficiency of the complete equation was found to be .90 when integer weights were applied as shown in this table.

Table 4. Comparison of Predictive Efficiency of Rating Factors and  
Background Variables for OGR Grades

(N = 996)

Variable	Variable Weighted <sup>a</sup>		
	Time 3 <sup>b</sup>	Time 2	Time 1
Formal Education	0	X	0
Special Training & Work Experience	0	0	0
Working Conditions	X	0	X
Originality, Ingenuity, & Creativeness	X	X	X
Communication Skills	0	0	X
Interpersonal Skills	0	X	0
Judgment & Decision Making	X	X	0
Planning	0	X	X
Management	X	X	X
Risk	0	X	0
Field Grade Rating	X	X	X
Level of Organization in Air Force	X	X	X
Level of Job in Organization	X	X	X
Supervisors Judged Grade	X	X	X
Supervisors Judged Grade Lieutenant	X	X	X
Supervisors Judged Grade Captain	X	X	X
Supervisors Judged Grade Major	X	0	0
Supervisors Judged Grade Lieutenant Colonel	X	X	X
Supervisors Judged Grade Colonel	X	X	X
Supervisors Judged Grade General	0	0	0
$R^2$	.82	.83	.86
R	.90	.91	.93

<sup>a</sup> Regression weights not given; "0" means variable received zero weight in computation, "X" means a non-zero weight.

<sup>b</sup> Time 3 = Benchmark Scales, ratings collected Oct 65 through Feb 66.

Time 2 = OGR Projection Sample, adjective scale, ratings collected Oct through Dec 64.

Time 1 = OGR Equation Development Sample, adjective scale, ratings collected Jan through Mar 64.

Table 5. Contribution of Membership Variables in Aircrew and Scientific and Development Engineering Career Fields to Efficiency of Grade Prediction

Variable	Variable Weighted <sup>a</sup>						
	Benchmark Rated Data Only						
	0 <sup>b</sup>	0 <sup>c</sup>	0 <sup>d</sup>	0 <sup>e</sup>	0 <sup>f</sup>	0 <sup>g</sup>	0 <sup>h</sup>
Formal Education	0	0	0	0	0	0	0
Special Training & Work Experience	X	X	X	X	X	X	X
Working Conditions	X	X	X	X	X	X	X
Originality, Ingenuity, & Creativeness	0	0	0	0	0	0	0
Communication Skills	0	0	0	0	0	X	0
Interpersonal Skills	X	X	X	X	X	X	X
Judgment & Decision Making	0	0	0	0	0	0	0
Planning	X	X	X	X	X	X	X
Management	0	0	0	0	0	0	0
Risk	X	X	X	X	X	X	X
Mean Grade Rating	0	0	0	0	0	X	0
Level of Organization in Air Force	X	X	X	X	X	X	X
Level of Job in Organization	X	X	X	X	X	X	X
Supervisors Judged Grade	X	X	X	X	X	X	X
Supervisors Judged Grade Lieutenant	X	X	X	X	X	X	X
Supervisors Judged Grade Captain	X	X	X	X	X	X	X
Supervisors Judged Grade Major	X	X	X	X	X	X	X
Supervisors Judged Grade Lieutenant Colonel	X	X	X	X	X	X	X
Supervisors Judged Grade Colonel	X	X	X	X	X	X	X
Supervisors Judged Grade General	0	0	0	0	0	0	0
Pilot Jobs <sup>i</sup> (AFSC 10XX, 11XX, 12XX, 13XX, 14XX)	X	X	X	--	--	--	--
Navigator Jobs <sup>i</sup> (AFSC 15XX)	X	X	--	X	--	--	--
Pilot and Navigator Jobs <sup>i</sup>	--	--	--	--	--	X	--
Scientific & Development Engineering Jobs <sup>i</sup> (AFSC 26XX, 27XX, 28XX)	X	--	--	--	X	--	--
$R^2$	.82	.82	.82	.82	.82	.82	.82
$R$	.90	.90	.90	.90	.90	.90	.90

<sup>a</sup> Regression weights not given; "0" means variable received zero weight in computation, "X" means a non-zero weight, "--" means variable was not available in the predictor set for the problem presented.

<sup>b</sup> Pilot, navigator, and S&DE categories included.

<sup>c</sup> Pilot and navigator categories included.

<sup>d</sup> Pilot category included.

<sup>e</sup> Navigator category included.

<sup>f</sup> Scientific & Development Engineering category included.

<sup>g</sup> Combined pilot and navigator categories included.

<sup>h</sup> Included no data on membership in special categories.

<sup>i</sup> Categorical Membership variable, 1 if member, 0 if not.

**Table 6. Predictive Efficiency in the Three Rating Samples of the Variables  
Included in the Final Equation of the OGR Study**

(N = 996 Jobs)

Variable	Time 3 <sup>a</sup>	Time 2	Time 1
Special Training & Work Experience	0	0	0
Communication Skills	X	X	0
Judgment & Decision Making	X	X	0
Planning	X	X	X
Management	X	X	X
Mean Grade Rating	X	X	X
Level of Organization in Air Force	X	X	0
Level of Job in Organization	X	X	X
Supervisors Judged Grade Lieutenant	X	X	X
Supervisors Judged Grade Captain	X	X	X
Supervisors Judged Grade Major	X	X	0
Supervisors Judged Grade Lieutenant Colonel	X	X	X
Supervisors Judged Grade Colonel	X	X	X
Supervisors Judged Grade General	0	0	0
<i>R</i> <sup>2</sup>	.82	.83	.86
<i>R</i>	.90	.91	.93

<sup>a</sup> Time 3 = Benchmark Scales, ratings collected Oct 65 through Feb 66.

Time 2 = OGR Projection Sample, adjective scale, ratings collected Oct through Dec 64.

Time 1 = OGR Equation Development Sample, adjective scale, ratings collected Jan through Mar 64.

**Table 7. Integer Weights for Subcomposites of Organizational Level  
and Supervisor's Judged Grade for Position**

Variable	Integer Weight
<b>Organizational Levels Subcomposite</b>	
Level of Organization in Air Force	1
Level of Job in Organization	1
<b>Supervisor's Judgment Subcomposite</b>	
Supervisor's Judged Grade Lieutenant	-3
Supervisor's Judged Grade Captain	-2
Supervisor's Judged Grade Major	1
Supervisor's Judged Grade Lieutenant Colonel	5
Supervisor's Judged Grade Colonel	10

Table 8. Integer Weights for Final Grade Prediction Equation

Variable	Integer Weight
<b>Rated Data from Field</b>	
Special Training and Work Experience	3
Communication Skills	4
Judgment and Decision Making	2
Planning	1
Management	12
Mean Grade Rating from Field	4
Organizational Levels Subcomposite <sup>a</sup>	1
Supervisor's Judgment Subcomposite	4

<sup>a</sup> Computed according to weights given in Table 7.

**Note.**—Correlation of this composite, computed with integer weights for 996 jobs of this study, with the mean OGR grade = .90.

### III. SUMMARY

A set of job requirement factor scales based upon a benchmark scale presenting job titles to identify successive levels of requirement were derived. These scales were applied to 1000 Air Force officer position descriptions collected and previously applied in the Officer Grade Requirements study. Comparison of rating distributions based upon adjective scales and the benchmark scales revealed lower mean values, larger standard deviations, and superior zero-order validity of the ratings based on the benchmark scales. The predictive efficiency of optimal composites of the benchmark scales for both full sets of factors and the subset chosen for application in the Officer Grade Requirements study was equivalent to that of the adjective scales. A set of integer weights for use in field application of the equation was derived without significant loss of validity.

## APPENDIX I: BENCHMARK SCALES AND INSTRUCTIONS

### JOB REQUIREMENT FACTORS Benchmark Scales

#### DIRECTIONS

1. Find the sheet in your packet which is headed ASSIGNMENT INFORMATION. Complete the first portion of this form by filling in all the blocks except REMARKS, FACTOR RATINGS, and GRADE CODE by checking appropriate boxes and neatly printing requested information.
2. Carefully read the first job description in your packet and rate it on job requirement FACTOR 1. FORMAL EDUCATION. Notice that each of the 9 levels on the factor are defined by titles of benchmark jobs. A rating of "4" on Factor 1 would imply that you feel a job requires less formal education than benchmark jobs listed in levels 5 through 9. It would require more formal education than jobs listed at levels 1 through 3, and about the same amount of formal education as jobs listed at level 4. The benchmark jobs should be weighed carefully in making your decision. Jobs which are cited involving obsolete equipment should be considered as they were before such units became obsolete.
3. Next, rate the first job on Factors 2 through 10. In each instance study the factor definition and the benchmark jobs before making your rating.
4. Now decide what grade of Air Force officer should be assigned to the job described. Do this by writing the proper number from the Grade Code Listing in the GRADE CODE box for each job. Notice in the Grade Code that there are three numbers associated with each grade level except General. The three numbers in a set are used to show three levels of experience. For instance, a 4 represents a captain with a short time in grade, a 5 represents a captain with an average time in grade, and a 6 represents a captain with a long time in grade.
5. Now rate the remaining four jobs in your packet on the ten job requirement factors and on the grade rating code. When you have completed the ratings, answer the questions in the REMARKS section of the form. Gather all materials into the inclosed envelope and return to the Personnel Research Laboratory.

This Study Authorized under AFR 0-7, 1 Apr 1965  
AFPT 80-041(A), 1 Jan 1966

**FACTOR 1: FORMAL EDUCATION:** The amount of formal education required by the job. Consider the education obtained in high school, college, university, or professional school.

**LEVEL 9**

Chief, Computer Techniques Div, Hq Air Weather Service  
Industrial Engineer, Hq Air Base Wg  
Chief, Re-entry Vehicle Div, Strategic Missile Evaluation Sq

**LEVEL 8**

Nuclear Research Officer, Research Technology Div, AF Flight Dynamics Lab  
Chief, Military Affairs & Asst Staff Judge Advocate, Air Base Gp  
Chief Physiological Chemistry Dept, USAF School Aerospace Medicine

**LEVEL 7**

Deputy Commander for Maintenance, Strategic Wg  
Electronic Systems Installation Officer, Ground Electronics Engineering Installation Agency Sq  
Chief, Munitions Div, Hq Numbered Air Force

**LEVEL 6**

Chief Data Systems & Statistics, Combat Support Gp  
Base Vice Commander, Combat Support Gp  
Asst Staff Electronics Officer, Combat Evaluation Gp

**LEVEL 5**

Assistant DCS/Personnel, Hq Air Weather Service  
Aerial Reconnaissance Weather Officer, Weather Reconnaissance Sq  
Armament Staff Officer, Inspector General Gp

**LEVEL 4**

OIC Armament & Electronics Branch, Consolidated Aircraft Maintenance Sq  
Director of Personnel, Hq Combat Support Gp  
Electronic Warfare Officer, Strategic Reconnaissance Sq

**LEVEL 3**

Chief, Photographic Services Branch, Aerospace Reconnaissance Technical Wg  
Chief Munitions Maintenance Branch, Munition Maintenance Sq  
Organizational Maint Officer, Interceptor Fighter Sq

**LEVEL 2**

Chief Transportation Traffic Management, Transportation Sq  
Group Supply Officer, Aeromedical Evacuation Gp  
Base Fuels Officer, Fighter Wg

**LEVEL 1**

Automotive Maintenance Officer, Transportation Sq  
Food Service Officer, Combat Support Gp  
Clothing Sales Officer, Combat Support Gp



**FACTOR 2: SPECIAL TRAINING AND WORK EXPERIENCE:** The extent to which the job requires knowledges and skills which must be acquired through special training courses or on-the-job experience. Disregard general courses given by Squadron Officer School, Command and Staff College, or War College.

#### **LEVEL 9**

Chief, Contract Pricing Branch, Hq USAF  
Chief, Military Justice Division, Air Div  
Space Vehicle Research Officer, Hq AF Special Weapons Center

#### **LEVEL 8**

Chief, Geodetic Survey Div, Geodetic Survey Sq  
Minuteman Trajectory Engineer, Aerospace Tech Wg  
Chief, Missile/Nuclear Safety Division, Technical Training Center

#### **LEVEL 7**

Missile Combat Crew Commander, Support Sq  
Chief, Target Intelligence Branch, Strategic Aerospace Wg  
Pilot, B-58 Bomber, Bomb Sq

#### **LEVEL 6**

Wing Director of Personnel, Bomb Wg  
Flying Safety Officer, Hq Tactical Fighter Wg  
Reconnaissance Aircraft Commander, Support Sq

#### **LEVEL 5**

Co-pilot B-52, Bomb Sq  
Pilot, Troop Carrier, Troop Carrier Sq  
Radar Evaluation Officer, Hq Major Air Command (Overseas)

#### **LEVEL 4**

Co-pilot KC-97, Air Refueling Sq  
Electronic Warfare Officer B-52, Bomb Sq  
Radar Intercept Officer, Fighter Intercept Sq

#### **LEVEL 3**

Crypto Operations Officer, Communications Gp (Overseas)  
Avionics Officer, Consolidated Aircraft Maintenance Sq  
Flight Line Maintenance Officer, Organizational Maintenance Sq

#### **LEVEL 2**

Photographic Equipment Maintenance Officer, Armament & Electronic Maintenance Sq  
Chief, Pay & Travel Branch, Combat Support Gp  
Photographic Officer, Technical Reconnaissance Sq

#### **LEVEL 1**

Base Housing Officer, Combat Support Gp  
Personnel Services Officer, Fighter Gp  
Transportation Officer, Instrumentation Sq

**FACTOR 3: WORKING CONDITIONS:** The extent to which the job involves uncomfortable working conditions. Consider such conditions as isolation, irregular hours, monotony, prolonged vigilance, extensive TDY, and pressure to meet deadlines.

#### **LEVEL 9**

B-58 Aircraft Commander, Bomb Sq  
Co-pilot KC-135, Air Refueling Sq  
Commanding Officer, B-52 Bomb Sq

#### **LEVEL 8**

Pilot, Reconnaissance, Tactical Reconnaissance Sq (Overseas)  
Tactical Fighter Pilot, Tactical Fighter Sq  
B-26 Instructor Pilot, Fighter Sq (Commando)

#### **LEVEL 7**

Pilot, Search and Rescue, Air Rescue Sq  
Weapons Controller, Air Early Warning and Control Sq  
Transport Instructor Navigator, Troop Carrier Sq

#### **LEVEL 6**

Electrical Engineer, Site Activation Task Force  
Instructor Pilot C-97 Aircraft, Operations Sq  
Chief, Division Intelligence, Hq Air Div (Overseas)

#### **LEVEL 5**

Weather Forecaster, Det, Weather Gp  
Chief, Logistics Division, Aerospace Wg  
Nurse Anesthetist, Medical Group

#### **LEVEL 4**

Transportation Officer, Transportation Sq  
Director of Manpower and Organization, Hq Air Div SAGE  
Chief Airman Personnel Division, Hq CONAC

#### **LEVEL 3**

Asst Staff Judge Advocate, Combat Support Gp  
Clinical Psychologist, Aerospace Medical Gp  
Chief Military Justice Division, Hq AF Missile Test Center

#### **LEVEL 2**

Personnel Services Officer, Air Base Gp  
Pharmacy Officer, Numbered USAF Hospital  
Staff Chaplain, Hq EASTAF

#### **LEVEL 1**

Officers' Open Mess Secretary, Support Gp  
Custodian, Non Appropriated Funds, Air Base Wg  
Information Officer, Bomb Wg

**FACTOR 4: ORIGINALITY, INGENUITY, AND CREATIVENESS:** The extent to which the job requires new and unique methods, approaches, and solutions to problems. Consider the demand for novel ideas and inventiveness.

**LEVEL 9**

Research Aviation Physiologist, USAF School of Aviation Medicine  
Astronautical Engineer, Propulsion, Hq AF Missile Development Center  
Human Performance Engineer, Electronic Systems Div

**LEVEL 8**

Logistic Staff Officer, Hq Air Materiel Area  
Manpower Management Staff Officer, Hq Major Air Command  
Director, Department of Aircraft Maintenance Training, Tech School

**LEVEL 7**

Missile Safety Officer, Hq Air Proving Ground Center Safety Div  
Base Deputy Commander for Materiel, Combat Support Gp  
Management Engineering Officer, Hq Air Materiel Area

**LEVEL 6**

Civil Engineer, Civil Engineer Sq  
Chief Re-Entry Vehicle Maintenance Branch, Missile Maintenance Sq  
Flying Safety Officer, Hq Tactical Fighter Wg

**LEVEL 5**

Missile Combat Crew Commander, Strategic Missile Sq  
Reconnaissance Pilot, Day Photo Jet, Tactical Reconnaissance Sq  
Commander, Weather Sq

**LEVEL 4**

Precision Photographic Services Officer, Hq Sq, Strategic Wg  
Chief Transportation Traffic Management, Transportation Sq  
Computer Maintenance Officer, Support Sq

**LEVEL 3**

Launch Area Maintenance Officer, Air Defense Missile Sq  
Academic Instructor-Undergraduate Pilot Training, Student Sq  
Clinical Laboratory Officer, Numbered USAF Hospital

**LEVEL 2**

Asst Base Equipment Management Officer, Supply Sq  
Co-Pilot B-52 Heavy Bomber, Bomb Sq  
Accounting & Finance Officer, Combat Support Gp

**LEVEL 1**

Asst Medical Supply Officer, Medical Gp  
Optometry Officer, Numbered USAF Hospital  
Administrative Officer, Air Base Gp

**FACTOR 5: COMMUNICATION SKILLS:** The extent to which the job requires skill in oral and written communication. Consider the complexity and variety of information communicated as well as the level of the individuals and agencies involved.

#### **LEVEL 9**

Command Director of Information, Hq Major Air Command  
Political Military Affairs Officer, Hq USAF  
Secretary of the Air Staff, Hq USAF

#### **LEVEL 8**

Chief of Logistics Division, Hq Numbered Air Force  
Astronautical Engineer, Hq Research Technology Div  
OSI District Commander, Hq District OSI

#### **LEVEL 7**

Base Civil Engineer, Support Gp  
Human Performance Engineer, Electronic Systems Div  
Wing Comptroller, Air Base Wg

#### **LEVEL 6**

Aviation Physiologist, Inspector General Gp  
Chemical Engineer, AF Aero Propulsion Lab  
Administrative Services Officer, Ground Electronics Engineering Installation Agency

#### **LEVEL 5**

Officer Selection Officer, Det, USAF Recruiting Gp  
Deputy Commander, Strategic Missile Sq  
Chief, Sensors Section, AF Special Weapons Center

#### **LEVEL 4**

Construction Engineer, Civil Engineering Sq (Overseas)  
Squadron Operations Officer, Combat Crew Training Sq  
Accounting & Finance Officer, Fighter Gp

#### **LEVEL 3**

Commercial Transportation Officer, Material Sq  
Avionics Officer, Air Early Warning Control Wg  
Missile Maintenance Control Officer, Strategic Missile Sq

#### **LEVEL 2**

Fighter Interceptor Pilot, Fighter Interceptor Sq  
Strategic Missile Complex Maintenance Officer, Strategic Missile Sq  
Electronic Warfare Officer, Tactical Reconnaissance Sq

#### **LEVEL 1**

Co-pilot, Air Refueling Sq  
Navigator, Bomb Sq  
Helicopter Pilot Flight Commander, Logistic Supply Gp

**FACTOR 6: INTERPERSONAL SKILLS:** The extent to which the job requires skill in dealing with people. Consider the need for sensitiveness, responsiveness, persuasiveness, self-control, and tact, as well as the possible consequences when such skills are not employed.

**LEVEL 9**

Staff Chaplain, Hq WESTAF  
Political Military Affairs Officer, Hq USAF  
Wing Commander, Air Refueling Wg

**LEVEL 8**

Asst Professor of Economics, USAFA  
Academic Instructor, Dept of Chemistry & Physiology, USAFA  
Security Staff Officer, Hq Major Air Command

**LEVEL 7**

Commissary Officer, Air Base Gp  
Wing Director of Safety, Bomb Wg  
OSI Detachment Commander, OSI Det

**LEVEL 6**

Base Procurement Officer, Navigator Training Wg  
Instructor Navigator Bombardier, Navigator Training Wg  
Comptroller, Air Materiel Area

**LEVEL 5**

Personnel Officer, Radar Bomb Scoring Sq  
Base Supply Officer, Combat Support Gp  
Chief Accounting and Finance Division, Combat Support Gp

**LEVEL 4**

Personnel Services Officer, Support Sq  
Chief, Medical Materiel Services, Medical Gp  
Maintenance Supervisor, Armament and Electronics Maintenance Sq

**LEVEL 3**

Air Freight Supervisor, Air Terminal Sq  
Airborne Electronics Maintenance Officer, Fighter Interceptor Sq  
Construction Engineer, Civil Engineering Sq (Overseas)

**LEVEL 2**

OIC Photo Laboratory Section, Reconnaissance Tech Sq  
Avionics Officer, Armament & Electronics Maint Sq  
Precision Photographic Services Officer, Strategic Wg

**LEVEL 1**

OIC Weapons Services Branch, Munition Maintenance Sq  
Navigator, Air Refueling Sq  
Co-pilot, Air Refueling Sq

**FACTOR 7: JUDGMENT AND DECISION MAKING:** The importance and independence of judgments and decisions required by the job. Consider the nature, variety, and possible impact of decisions. The less well defined the guidance for decisions, the higher should be the rating; while the more specific and detailed the guidance, the lower should be the rating.

**LEVEL 9**

Chief, Budget Div, Hq Major Air Command  
Staff Legal Officer, Military Affairs, Hq USAF  
Chief, Weapon System Testing Div, Ballistic Systems Div

**LEVEL 8**

Base Vice Commander, Combat Support Gp  
Missile Maintenance Inspector, IG, Hq Major Air Command  
DCS/Comptroller, Hq Numbered Air Force (Overseas)

**LEVEL 7**

Logistics Officer, Hq Ballistic Systems Div  
Experimental Flight Test Officer, Hq Aerospace Systems Div  
Director of Personnel, Combat Support Gp

**LEVEL 6**

Commander, Organizational Maintenance Sq  
Missile Safety Officer, Strategic Missile Wg  
Missile Combat Crew Commander (ICBM), Strategic Missile Sq

**LEVEL 5**

Site Maintenance Officer, Strategic Missile Wg  
Base Operations Officer, Combat Support Gp  
Aircraft Commander KC-135, Air Refueling Sq

**LEVEL 4**

Munitions Maintenance Supervisor, Munitions Maintenance Sq  
Aircraft Commander U-2, Strat Recon Weather Sq  
Fighter Interceptor Pilot, Fighter Interceptor Sq

**LEVEL 3**

Reconnaissance Pilot, Mapping & Charting Sq  
Pilot, Transport, Troop Carrier Sq  
Chief, Base Services Div, Support Sq

**LEVEL 2**

Traffic Management Officer, Transportation Sq  
Navigator, Bomb Sq  
Helicopter Pilot, Combat Support Gp

**LEVEL 1**

Recreation Services Officer, Combat Support Gp  
Pharmacy Officer, USAF Dispensary  
Photographic Officer, Technical Reconnaissance Sq

**FACTOR 8: PLANNING:** The extent to which planning is required by the job. Consider the scope and significance of work for which planning is done. The longer the time span for which planning is done, the higher the rating should be.

#### **LEVEL 9**

Deputy Chief, Plans Division, Hq Major Air Command  
Asst Director of War Plans, Hq Major Air Command  
Director Gemini Launch Vehicle Directorate, Hq Space Systems Div

#### **LEVEL 8**

Chief, R & D Contracts Div, Hq AF Special Weapons Center  
Management Engineering Officer, Hq Air Materiel Area  
Wing Logistics Officer, Air Refueling Wg

#### **LEVEL 7**

Maintenance Control Officer, Missile Training Wg  
Base Vice Commander, Combat Support Gp  
Budget Officer, Air Base Gp

#### **LEVEL 6**

Operations Officer, Fighter Interceptor Sq  
Hospital Administrator, Numbered USAF Hospital  
Chief, Data Services Division, Combat Support Gp

#### **LEVEL 5**

Chief, Officer Personnel Branch, Air Base Gp  
Traffic Management Officer, Transportation Sq  
Procurement Officer, Combat Support Gp

#### **LEVEL 4**

Missile Combat Crew Commander, Strategic Missile Sq  
Wing Administration Officer, Troop Carrier Wg  
Aircraft Commander, Defense Sys Eval Sq

#### **LEVEL 3**

Electronic Warfare Officer, Bomb Sq  
Medical Administrative Officer, USAF Dispensary  
Reconnaissance Pilot, Day Jet, Tactical Recon Sq

#### **LEVEL 2**

Fighter Interceptor Pilot, Fighter Interceptor Sq  
Registrar, Medical Gp  
Air Police Officer, Combat Defense Sq

#### **LEVEL 1**

Asst Photo Officer, Armament & Electronic Maintenance Sq  
Weather Forecaster, Det, Weather Sq  
Optometrist, Medical Gp

**FACTOR 9: MANAGEMENT:** The level of executive, and managerial skills required in the job. Consider the complexity, variety, and level of the activities which are directed, organized, coordinated, controlled, commanded, or evaluated.

**LEVEL 9**

Director of Budget, Hq Major Air Command  
Commander, Combat Support Gp (Overseas)  
Wing Commander, Strategic Aerospace Wg

**LEVEL 8**

Chief, Manpower Validation Team, Support Sq  
Chief of Operations, Air Defense Missile Sq  
Group Executive Officer, Air Base Gp

**LEVEL 7**

Maintenance Supervisor, Armament & Electronics Maintenance Sq  
Squadron Operations Officer, Combat Crew Training Sq  
Base Accounting & Finance Officer, Flying Training Wg

**LEVEL 6**

Deputy Director of Personnel, Combat Support Gp  
Base Procurement Officer, Pilot Training Wg  
Helicopter Squadron Operations Officer, Flying Training Sq

**LEVEL 5**

Traffic Management Officer, Transportation Sq  
Base Communications Maintenance Officer, Communications Sq (Overseas)  
Missile Combat Crew Commander, Strategic Missile Sq

**LEVEL 4**

OIC Utilities Operations Division, Civil Engineering Sq  
OIC Photo Evaluation Branch, Mapping & Charting Sq  
Base Fuels Officer, Supply Sq

**LEVEL 3**

Primary Pilot Training Instructor, Pilot Training Sq  
Space Surveillance Officer, Aerospace Control Sq  
Air Traffic Controller, Communication Sq

**LEVEL 2**

Administrative Officer, Air Base Sq  
Data Services Officer, Combat Support Gp  
Tactical Fighter Pilot, Tactical Fighter Sq

**LEVEL 1**

Clinical Psychologist, Named USAF Hospital  
Psychiatric Social Worker, Named USAF Hospital  
Helicopter Pilot Single Rotor, Air Base Sq



**FACTOR 10: RISK:** The extent to which the job requires exposure to risk of death or severe injury in peace-time.

**LEVEL 9**

Pilot KC-135, Air Refueling Sq  
Tactical Fighter Pilot, Tactical Fighter Sq  
Instructor Pilot, Tactical Fighter, Combat Crew Training Sq

**LEVEL 8**

Co-pilot KC-97, Air Refueling Sq  
Navigator, Troop Carrier, Troop Carrier Sq  
Pilot C-133, Air Transport Service

**LEVEL 7**

Instructor Missile Launch Officer, Strategic Missile Sq  
Arctic Survival Training Officer, Strategic Wg (Overseas)  
Chief, Propellants Programming Br, AF Rocket Propulsion Laboratory

**LEVEL 6**

Commander, Radar Sq  
Research Biochemist, School of Aerospace Medicine  
Chemist, Air Force Materials Laboratory

**LEVEL 5**

Chief, General Investigations Div, Hq District OSI  
Base Veterinarian, Numbered USAF Hospital  
Commander, Civil Engineering Sq

**LEVEL 4**

Mechanical Engineer, Hq AF Missile Development Center  
Air Traffic Control Officer, Communications Sq  
Instructor, Warfare Systems School

**LEVEL 3**

Medical Supply Officer, Numbered USAF Hospital  
Chief, Engineering Standards Branch, Communications Region  
Chief Machine Processing, Support Gp

**LEVEL 2**

Recreation Services Officer, Combat Support Gp  
Chaplain, Combat Support Gp  
Manpower Management Staff Officer, Flying Training Wg

**LEVEL 1**

Custodian Non Appropriated Funds, Air Base Wg  
Clothing Sales Store Officer, Air Base Wg  
Instructor, French, Dept of Foreign Languages, USAFA

# APPENDIX II: VARIABLES AND INTERCORRELATIONS

Variable Name	Mean	S.D.
1 Formal Education (T3) <sup>a</sup>	5.16	1.63
2 Special Training and Work Experience (T3)	5.80	1.42
3 Working Conditions (T3)	5.21	1.76
4 Originality, Ingenuity, and Creativeness (T3)	5.14	1.64
5 Communication Skills (T3)	5.30	1.83
6 Interpersonal Skills (T3)	5.58	1.71
7 Judgment and Decision Making (T3)	5.41	1.63
8 Planning (T3)	5.25	1.72
9 Management (T3)	5.21	1.86
10 Risk (T3)	4.48	2.52
11 Mean Grade Rating (T3)	7.88	2.95
12 Formal Education (T2) <sup>b</sup>	5.77	1.04
13 Special Training and Work Experience (T2)	6.26	0.80
14 Working Conditions (T2)	5.16	1.27
15 Originality, Ingenuity, and Creativeness (T2)	5.43	1.03
16 Communication Skills (T2)	5.94	1.11
17 Interpersonal Skills (T2)	5.95	0.99
18 Judgment and Decision Making (T2)	6.00	0.95
19 Planning (T2)	5.83	1.08
20 Management (T2)	5.63	1.20
21 Risk (T2)	4.32	2.04
22 Mean Grade Rating (T2)	7.85	2.76
23 Formal Education (T1) <sup>c</sup>	5.71	1.01
24 Special Training and Work Experience (T1)	6.22	0.72
25 Working Conditions (T1)	5.15	1.18
26 Originality, Ingenuity, and Creativeness (T1)	5.37	0.99
27 Communications Skills (T1)	5.81	1.08
28 Interpersonal Skills (T1)	5.89	0.94
29 Judgment and Decision Making (T1)	5.87	0.91
30 Planning (T1)	5.71	1.03
31 Management (T1)	5.54	1.17
32 Risk (T1)	4.34	1.96
33 Mean Grade Rating (T1)	7.66	2.71
34 Level of Organization in the Air Force (PV22)	4.95	2.08
35 Level of Job in Organization (PV25)	3.97	1.72
36 Supervisors Judged Grade (PV28)	3.85	1.17
37 Supervisors Judgment - Lt (PV29)	0.08	0.26
38 Supervisors Judgment - Capt (PV30)	0.28	0.45
39 Supervisors Judgment - Maj (PV31)	0.34	0.47
40 Supervisors Judgment - Lt Col (PV32)	0.21	0.41
41 Supervisors Judgment - Col (PV33)	0.08	0.26
42 Supervisors Judgment - Gen (PV34)	0.	0.
43 UMD Authorized Grade (PV35)	3.67	1.18
44 Officer's Present Grade (PV42)	3.47	1.35
45 Criterion Board Mean Action (PV76)	7.59	2.74
46 Rating Factors Composite	7.59	2.23
47 Organization Levels Composite	7.59	1.80
48 Supervisors Judgment Composite	7.59	2.10
49 Pilot Jobs	0.24	0.43
50 Navigator Jobs	0.06	0.23
51 Pilot and Navigator Jobs	0.29	0.46
52 Scientific and Development Engineering Jobs	0.10	0.30

<sup>a</sup> Time 3 = Benchmark Scales, ratings collected Oct 1965 through Feb 1966.

<sup>b</sup> Time 2 = OGR Projection Sample, adjective scale, ratings collected Oct through Dec 1964.

<sup>c</sup> Time 1 = OGR Equation Development Sample, adjective scale, ratings collected Jan through Mar 1964.

# Intercorrelations of Job Evaluation Factors, Background Variables, and Criteria

(N = 996 Jobs)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	XXX	.79	-.17	.77	.79	.66	.75	.72	.60	-.36	.74	.79	.46	-.26	.63	.63	.45	.46	.53	.46	-.39	.66	.84	.49	-.25	.67	.66	.47
2		XXX	.26	.78	.65	.59	.81	.69	.61	.07	.74	.57	.60	.11	.54	.49	.36	.59	.51	.41	.01	.64	.59	.66	.13	.55	.50	.37
3			XXX	.03	-.27	-.16	.10	-.11	-.06	.82	-.03	-.25	.32	.77	-.13	-.25	-.15	.28	-.05	-.14	.75	-.07	-.27	.35	.84	-.16	-.27	-.16
4				XXX	.82	.71	.85	.86	.76	-.16	.82	.56	.45	-.12	.71	.63	.45	.52	.63	.55	-.24	.72	.59	.47	-.10	.77	.66	.47
5					XXX	.88	.81	.84	.78	-.45	.84	.60	.32	-.36	.65	.79	.63	.41	.58	.60	-.49	.76	.64	.33	.33	-.35	.72	.83
6						XXX	.77	.73	.74	-.32	.79	.50	.30	-.23	.55	.72	.72	.41	.50	.58	-.36	.71	.53	.33	-.23	.62	.78	.77
7							XXX	.86	.83	-.14	.88	.53	.48	-.04	.60	.61	.51	.62	.61	.61	-.20	.78	.55	.51	-.01	.65	.64	.54
8								XXX	.90	-.30	.89	.51	.38	-.22	.65	.64	.47	.49	.73	.69	-.36	.81	.52	.40	-.21	.69	.66	.48
9									XXX	-.26	.89	.40	.33	-.17	.56	.58	.50	.47	.65	.77	-.32	.82	.41	.35	-.15	.59	.61	.52
10										XXX	-.25	-.37	.19	.69	-.25	-.36	-.24	.10	-.19	-.31	.90	-.27	-.41	.20	.74	-.32	-.41	-.27
11											XXX	.53	.44	-.14	.61	.66	.55	.54	.67	.71	-.31	.88	.55	.48	-.11	.66	.69	.59
12												XXX	.54	-.24	.64	.64	.48	.47	.51	.44	-.40	.58	.83	.42	-.29	.57	.56	.41
13													XXX	.32	.46	.42	.36	.66	.51	.39	.17	.52	.39	.60	.24	.34	.29	.25
14														XXX	-.12	-.26	-.09	.28	-.06	-.13	.74	-.11	-.31	.26	.78	-.24	-.31	-.15
15															XXX	.74	.55	.58	.73	.61	-.27	.65	.56	.35	-.18	.73	.60	.44
16																XXX	.77	.52	.66	.63	-.39	.71	.56	.30	-.29	.64	.80	.65
17																	XXX	.51	.52	.63	-.26	.62	.41	.26	-.14	.48	.66	.76
18																		XXX	.67	.56	.10	.63	.37	.50	.23	.42	.38	.35
19																			XXX	.77	-.23	.74	.41	.37	-.09	.57	.52	.38
20																				XXX	-.34	.80	.35	.27	-.17	.51	.52	.51
21																					XXX	-.32	.43	.15	.71	-.35	-.43	-.28
22																						XXX	.53	.45	-.12	.63	.67	.58
23																							XXX	.52	-.30	.66	.64	.48
24																								XXX	.34	.44	.37	.32
25																									XXX	-.19	-.29	-.12
26																										XXX	.75	.58
27																											XXX	.80
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29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
.47	.57	.47	-.40	.68	.54	.31	.35	-.12	-.22	-.03	.15	.34	.00	.35	.33	.61	.74	.52	.41	-.36	-.14	-.41	.48
.60	.55	.42	.01	.66	.40	.17	.39	-.21	-.25	.00	.20	.31	.00	.43	.41	.61	.75	.35	.45	-.01	-.08	-.04	.35
.28	-.05	-.14	.76	-.07	-.28	-.29	-.01	-.04	.00	-.02	.03	-.01	.00	.06	.05	.03	-.05	.36	.02	.53	.20	.60	-.11
.56	.70	.60	-.23	.73	.52	.34	.42	-.16	-.28	.02	.18	.34	.00	.42	.40	.67	.85	.53	.46	-.20	-.14	-.25	.42
.45	.67	.65	-.50	.78	.62	.49	.47	-.18	-.34	.05	.21	.37	.00	.48	.46	.72	.88	.69	.52	-.35	-.23	-.44	.32
.49	.58	.65	-.37	.73	.47	.47	.48	-.21	-.36	.08	.23	.34	.00	.49	.50	.69	.82	.59	.52	-.23	-.24	-.34	.20
.67	.69	.67	-.20	.80	.51	.37	.48	-.19	-.33	.02	.23	.39	.00	.51	.48	.75	.91	.55	.54	-.16	-.20	-.25	.30
.51	.79	.73	-.37	.82	.59	.47	.50	-.20	-.36	.03	.25	.38	.00	.52	.50	.76	.94	.66	.55	-.28	-.15	-.34	.33
.53	.74	.83	-.34	.83	.49	.52	.53	-.21	-.39	.04	.27	.40	.00	.58	.55	.79	.97	.64	.59	-.25	-.23	-.35	.23
.08	-.23	-.32	.93	-.28	-.43	-.34	-.12	-.02	-.09	.01	-.02	-.12	.00	-.07	-.04	-.22	-.27	-.48	-.12	.68	.26	.77	-.16
.61	.77	.77	-.32	.91	.60	.48	.59	-.24	-.41	.00	.30	.48	.00	.64	.61	.86	.94	.67	.67	-.25	-.16	-.31	.27
.34	.45	.36	-.39	.53	.43	.22	.28	-.09	-.16	-.02	.07	.30	.00	.26	.22	.46	.51	.41	.32	-.37	-.11	-.41	.45
.46	.38	.28	.14	.45	.20	.04	.30	-.16	-.18	-.02	.13	.28	.00	.35	.33	.43	.41	.15	.36	.04	.05	.06	.19
.21	-.13	-.17	.68	-.13	-.30	-.32	-.03	.02	-.03	.02	.01	.27	.00	.03	.02	-.08	-.18	-.39	.00	.44	.21	.52	-.17
.42	.61	.51	-.28	.60	.44	.32	.28	-.10	-.18	.01	.11	.27	.00	.31	.28	.52	.63	.47	.32	-.24	-.17	-.31	.38
.38	.58	.54	-.40	.66	.48	.41	.39	-.15	-.28	.03	.16	.33	.00	.40	.38	.61	.67	.55	.44	-.29	-.18	-.36	.25
.42	.45	.53	-.28	.58	.28	.37	.37	-.14	-.29	.03	.17	.32	.00	.41	.43	.56	.55	.41	.44	-.20	-.19	-.28	.08
.63	.49	.43	.06	.56	.25	.15	.32	-.14	-.23	.03	.14	.33	.00	.39	.36	.53	.53	.25	.41	.03	-.05	.00	.19
.46	.72	.62	-.24	.68	.43	.33	.41	-.16	-.27	.00	.17	.36	.00	.45	.41	.63	.68	.47	.47	-.17	-.07	-.20	.25
.45	.66	.80	-.37	.73	.40	.46	.47	-.16	-.33	.00	.23	.40	.00	.52	.50	.71	.73	.54	.54	-.30	-.25	-.40	.14
.04	-.28	-.36	.90	-.32	-.45	-.37	-.14	-.01	-.10	.01	-.03	.15	.00	-.11	-.06	-.27	-.33	.51	.15	.67	.27	.76	-.18
.58	.75	.77	-.33	.90	.58	.49	.60	-.24	-.41	-.02	.31	.50	.00	.66	.61	.88	.85	.67	.69	-.28	-.16	-.34	.24
.43	.50	.41	-.42	.58	.44	.25	.26	-.06	-.15	.03	.09	.27	.00	.24	.22	.47	.54	.43	.30	-.39	-.16	-.45	.49
.64	.47	.35	.18	.52	.19	.04	.27	-.14	-.16	.03	.14	.24	.00	.32	.30	.44	.43	.14	.32	.06	.00	.05	.19
.29	-.06	-.13	.76	-.09	-.29	-.31	-.03	.01	-.03	.01	.04	-.03	.00	.03	.03	.05	.16	.38	.00	.47	.20	.55	-.17
.56	.73	.62	-.33	.67	.47	.37	.30	-.08	-.21	.00	.10	.29	.00	.32	.30	.56	.68	.52	.34	-.29	-.17	-.36	.43
.51	.68	.63	-.43	.72	.51	.46	.39	-.16	-.26	.00	.18	.33	.00	.43	.42	.64	.70	.60	.45	-.31	-.18	-.38	.25
.55	.56	.63	-.28	.64	.30	.42	.38	-.16	-.28	.01	.18	.32	.00	.42	.44	.59	.57	.45	.44	-.19	-.21	-.28	.07
XXX	.66	.61	.06	.66	.24	.22	.35	-.15	-.25	.03	.19	.32	.00	.41	.41	.59	.58	.29	.43	.05	-.16	-.03	.18
XXX	.81	-.27	.81	.50	.41	.53	.51	-.18	-.38	.00	.27	.41	.00	.51	.48	.73	.76	.57	.53	-.21	-.10	-.25	.29
XXX	-.36	.83	.41	.53	.41	.53	.51	-.18	-.38	.00	.27	.41	.00	.57	.55	.78	.79	.59	.58	-.29	-.25	-.40	.14
XXX	-.32	.46	-.39	-.16	.01	.11	-.01	.11	-.01	.03	-.16	.16	.00	.13	-.08	-.27	-.34	.53	.17	.69	.26	.77	-.17
XXX	.59	.52	.61	-.26	-.43	-.01	.32	.50	.00	.68	.64	.90	.86	.69	.71	.27	.16	.33	.23	.22	.16	-.33	.23
XXX	.28	.34	-.14	-.22	.02	.11	.31	.00	.35	.31	.52	.56	.79	.38	-.33	.10	.36	.22	.10	.36	.22	.10	.36
XXX	.41	-.18	-.27	.00	.25	.26	.00	.43	.40	.54	.50	.81	.44	-.23	-.19	-.31	.04	.44	-.23	-.19	-.31	.04	.44
XXX	.45	-.46	.09	.50	.53	.00	.72	.68	.65	.54	.47	.89	-.15	-.01	-.14	.00	.47	.89	-.15	-.01	-.14	.00	.47
XXX	-.18	-.21	.15	-.08	.00	-.37	-.40	-.26	-.22	.20	-.34	-.01	-.05	-.03	.07	.07	.22	.20	-.34	-.01	-.05	-.03	.07
XXX	-.45	-.32	.18	.00	-.52	-.45	-.44	-.39	-.31	-.55	.09	.03	.10	-.01	-.01	-.01	.04	.02	.07	.03	.01	.03	.04
XXX	-.37	-.21	.00	.00	.03	.06	.04	.27	.23	.47	.05	.04	.03	.02	.02	.02	.27	.23	.47	.05	.04	.03	.02
XXX	-.15	.00	.45	.39	.36	.27	.23	.47	.05	.04	.03	.02	.02	.02	.02	.27	.23	.47	.05	.04	.03	.02	.02
XXX	.00	.53	.48	.56	.41	.36	.73	.16	.07	.18	.05	.04	.03	.02	.02	.27	.23	.47	.05	.04	.03	.02	.02
XXX	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	.76	.74	.58	.49	.84	-.12	.00	.11	.02	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	.69	.56	.44	.76	.05	-.06	-.07	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	.82	.66	.77	.23	.14	-.29	.16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66	.66
XXX	.51	-.35	-.19	-.42	.16	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	-.16	-.03	-.17	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	-.14	.87	-.19	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	.38	-.08	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	-.22	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
XXX	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

## REFERENCES

- AF Manual 35-2. *Occupational analysis: Procedures for conducting occupational surveys and job evaluations*. Washington: Department of the Air Force, 10 January 1963.
- Christal, R. E. *Officer grade requirements project I. Overview*. PRL-TR-65-15, AD-622 806. Lackland AFB, Tex.: Personnel Research Laboratory, Aerospace Medical Division, September 1965.
- Haggard, E. A. *Intraclass correlation and the analysis of variance*. New York: Dryden Press, 1958, Chapter VIII.
- Hazel, J. T. *Officer grade requirements project II. Job descriptions, sample selection, and criterion board*. PRL-TR-65-18, AD-629 575. Lackland AFB, Tex.: Personnel Research Laboratory, Aerospace Medical Division, November 1965.
- Madden, J. M. *Context effects in job evaluation*. WADD-TN-60-220, AD-249 950. Lackland AFB, Tex.: Personnel Research Laboratory, Wright Air Development Division, October 1960.
- Madden, J. M. *Officer job evaluation in terms of merited pay versus merited grade*. PRL-TDR-63-12, AD-417 277. Lackland AFB, Tex.: Personnel Research Laboratory, Aerospace Medical Division, May 1963.
- Madden, J. M. & Giorgia, M. Joyce. *The methods and foundations of job evaluation in the United States Air Force*. ASD-TR-61-100, AD-271 372. Lackland AFB, Tex.: Personnel Research Laboratory, Aeronautical Systems Division, October 1961.

Unclassified

Security Classification

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13. ABSTRACT  This study provides a refinement of the procedures previously developed for the determination of the appropriate distribution of officer grades for the Air Force to permit application of the same position evaluation procedure to individual officer positions. A scale of benchmark jobs with titles of established successive levels of requirements was used to derive a set of job requirement factor scales. These scales were applied to 1000 Air Force officer position descriptions collected and previously applied in the Officer Grade Requirements Study. Comparison of rating distributions based upon adjective scales and the benchmark scales revealed lower mean values, larger standard deviations, and superior zero-order validity of the ratings based on the benchmark scales. The predictive efficiency of optimal composites of the benchmark scales was equivalent to that of the adjective scales. A set of integer weights for use in field application of the equations was derived without significant loss of validity.			

14. KEY WORDS	LINK A		LINK B		LINK C	
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